Letter from the President of Team Diablo

*It was 1986 when, in a small social club in Pieve di Cento, not far from Bologna, the first official headquarters of what was to later become the legendary Team Diablo was founded. At the time the club was called the "Gruppo Ballerini Pieve di Cento" (**The Group of Dancers from Pieve di Cento**), and Davide Cacciari, together with several volunteers including myself and the actual Vice President Fabio Turricchia, gave rise to this fantastic dream.*

*I witnessed this dream grow at incredible speed. With the passing of the years its official name changed to match its constant transformation, from the original lengthy version to the acronym "CEAD" (Centro Emiliano Amatori Danza – **Centre for Amateur Dancers in the Emilia Region**), reflecting the regional significance the club had then reached. "Top Dance 1" was the name under which the group started to achieve its first international success, and finally "Team Diablo", which signalled the completion of the group's transformation from a simple club of amateur dancers to a local, national and international centre for education in Dancesport.*

An incredible development, which I have personally experienced in different roles; I started as a dancer, then teacher, and today, with great satisfaction, as the third President in the history of this fantastic reality, after Primo Monti and successively Iliana Turricchia.

This book is, certainly for me as President, a great achievement, because what Team Diablo has developed over the years in terms of its educative process, needed to be described in writing and especially coordinated by an extremely qualified person like Professor Furio Barba, and with the contribution of the Team Diablo Academy, the flagship of our education system.

Furthermore, I must add that Team Diablo, notwithstanding its international development, has always maintained a strong connection with the city of Molinella, its second headquarters since 1988 (together with Pieve di Cento at the time), and then its head office in 1991. The city has always offered deep respect for this project; it is the pride of the town and the local businesses, starting from Team Diablo's long-time restaurant, Pizzeria 2000, are always ready to promote our initiatives, offering their full support.

The local council administration has always seen Team Diablo as an important local phenomenon; "Molinella, the City of Dancesport", the latest honour bestowed on us by the current administration, is the demonstration of the enormous consideration afforded the team, and I would like to take this opportunity to thank the local mayor, Dario Mantovani, and the Vice Mayor and the Councillor responsible for sport, Andrea Scalambra, for the support and trust demonstrated over the years.

Team Diablo has demonstrated over the years that dancing can be a high-value sport which gratifies and involves people in different roles operating at varying levels but who have a common goal which is reflected in the club's motto: quality and quantity. The numbers, which I'm sure will continue to

grow, express with clarity the determination defined by our project: competitively, among various national and international titles, Team Diablo boasts 121 world championship gold medals; quantitively the actual number of members is 9000 with competitors from 54 nations and 61 successful clubs which are affiliated to Team Diablo though its educative method.

The results, the numbers, the quality of the athletes and their teachers are significant elements, but the Team has gone above and beyond my personal expectations; the group actively promotes events, another winning point of the project, thanks to which events and competitions at every level are organised efficiently and effectively. It means more work but the effort put in is well rewarded, creating extraordinary results for which I want to thank the organisers of all our events, for their desire to promote dancesport.

It an enormous honour which gives me great satisfaction to be the President of this club, and I trust that this book is another starting point for further development in our much-loved club.

A final, most special thanks go to Davide and Olga for their commendable work over all these years.

Gianluca Stagni

Team Diablo President

PREFACE

It was the last day of the 19th Mini International Training Camp held in Molinella from the 17th July to the 1st August 2020, when Davide and I had a chat about our impressions of the Camp. We talked about many aspects and topics and at the end of our conversation we paused to reflect on the history of the Camp and its development over the years. Davide then asked me to condense a few thoughts into a written document, which then took on a life of its own.

The idea fascinated me because we had talked many times in the past about recording Team Diablo's activities, thereby continuing an editorial line which has seen various publications and texts written on a variety of topics relating to dancesport.

After the success of the technique books written for the WDSF, we were tentative in writing about various topics but this time it is of our own accord and, given my personal involvement, to do with the preparation methods in dancesport. The subject matter was tantalising and a meeting with Fabio made it even more so. We discussed a wide range of themes from teaching the technique to the necessity to be "excellent teachers" in terms of knowing how to transmit information clearly and correctly, and knowing how to work together with the athletes to find solutions to reach competitive goal; in short, develop a true educational system for a "maestro" in order to fulfil their "teaching function" comprehensively.

The research material we accumulated held memories steeped in passion.

The path which Team Diablo had followed during its development started to become clear; and that if its evolution is to continue, it was time to look to the past to avoid repeating errors already made and make use of the experience already accumulated in order to reach new heights; to look back and remember "*where it all started"* (from a few little things which our intuition suggested were the right ones to do), "*who we were"* (a bunch of crazy enthusiasts driven by willpower, curiosity, and an insatiable desire to learn so as to do better), and "*what we did back then"* (basically everything was dictated by the fashions of the time and this did not satisfy the desire of those who, thanks to the study of modern methodology in training, noticed that there were boundless fields of study to explore which could make sense of that strange term (sport) which accompanied dancing but seemed to be haphazardly attached to give pomposity to our activity). This was not just a nostalgic moment but one of pride when thinking of what has been achieved. It was gratifying to quantify the work done thinking about "*where we are now"* (much further along in everything), passing for "*who we are now"* (the same as we were before with the same, if not more, passion for what we do), and reaching *"what we do now"* (everything and more).

To see, as they came in, the contributions to this publication, together with the information, each piece dealt with at first as a single entity and then, as if they were meetings "between freemasons" and finally presented as an academic work in the only structure for "study and education" in dancesport in the world, that is the DanceSport Academy of Team Diablo, to see the passion, the interest of the participants, the enthusiasm of the teachers and the richness in the content of their discourse, the founding of the Research and Development Centre with its studies and ideas of the methodology of preparation and training, the inauguration of the Team Diablo Lab for the qualitative study in dancesport performances, gave meaning to the profound effort spent for the birth of a "formation and specialisation hub" for dancesport teachers (and a great deal of pride and satisfaction for a dream come true).

Sometimes, turning around and looking back to the past, you might think that not much has really been done (or so it may seem to some), but when what you see is not a void but your eyes come across organised structures predisposed for the growth and development of dancesport, the many teachers that have learned and reaped success with their athletes, and the many athletes who have been educated and have trained according to a Method that has grown and has evolved based on the scientific aspects, establishing itself as the only method based on such study, then it is time to linger for a moment and, breathing a sigh of satisfaction, reflect on how much has been proudly constructed and realise that, in actual fact, the work done has been enormous.

And now, because we can't and don't want to stay put, let's take inspiration from this publication which narrates the history and present of Team Diablo, and look to the future asking ourselves the same three questions, but which once again evolve into:

- *"Where will we go from here?"* We don't know with certainty, but definitely onwards and upwards because our desire for knowledge and the prospect of discovering new, fascinating challenges excites us like never before.
- *"Who are we now?"* This is the only question for which we have a clear answer: we are the only Dancesport Study Centre, we are the only Hub for the Education of Teachers of Dancesport, with the only structure for modern dancesport training in the world.
- *"What will we do now?"* This is perhaps the vaguest yet easiest to answer: more of everything. The passion, interest, study, curiosity all push us beyond every horizon, because the evolution of dancing will continue and Team Diablo will always try to be ahead of the times, ready to tackle every innovation ahead of the others.

And so we reach the end of this preface and I must thank all of those who have in some way contributed to this work (and the Organigram of Team Diablo follows), which represents the history of Team Diablo, but also the presentation of what happens day to day, using these principles which have brought such amazing results and have permitted the realisation of what we proudly call the Team Diablo Method.

Thanks to all

Furio Barba

Peter Maxwell has long been a promoter of educational projects and is known for being an innovative teacher whose main goal is to render each student clearly aware of each and every learned concept. His maxim is to train study-orientated dancers because the body can only work and coordinate efficiently if the mind works properly. His advice has always been to improve the education of Team Diablo's dancers, and in fact the Academy's very beginnings were inspired by his teachings, an Academy that he has always and constantly praised and encouraged. Thanks to his unlimited capacities, Peter has always held prominent positions in dancesport. His current roles as honorary president of the WDSF Professional Division, of Dancesport Europe and, above all, his position of the WDSF Presidium, are undisputed confirmations of his value which originate in his past as a competitor and, later, as an extremely successful teacher.
As a competitor he won every important international competition, was a many-time World Champion as an Amateur and as a Professional, excelling extraordinarily in both Standard and Latin American.
Peter is a keystone, for the academic project and for dance in general, a fundamental reference for technical, artistic, and cultural growth.

Team Diablo Organisational Chart

President
Gianluca Stagni

Vice President
Fabio Turricchia

Board of Directors
Stefan Green, Gabriele Goffredo, Manuela Traversi, Zeudi Zanetti, Fabio Bosco

Master Supervisor
Peter Maxwell

Technical Directors
Davide and Olga Cacciari

Directors of the Dancesport Academy and Dancesport Institute
Fabio and Marina Bosco

Scientific Manager of the Team Diablo Research and Development Centre
Furio Barba

TD Academy experience score masters
Pitton Silvia, Bussoletti Luca, Green Stefan, Bosco Paolo, Köhler Claudia, Zanetti Zeudi, Vulic Tjasa, Goffredo Gabriele-Pasquale, Goffredo Antonella, Matus Anna, Ferruggia Benedetto, Birarelli Cinzia, Berardi Isaia, Casini Sara, Loria Saverio, Mariniello Vincenzo, Cavallaro Marco, Sigona Adriana, Natali Michela, Regnoli Nicola

Team Diablo VideoLab Manager
Pasquale Nudo

Head of Physical Preparation for Team Diablo
Marco Cavacini

Head of Team Diablo's Sports Psychology Area
Mattia Cuocci

Head of the Diablo Team's Food Science Area
Francesca Calandriello

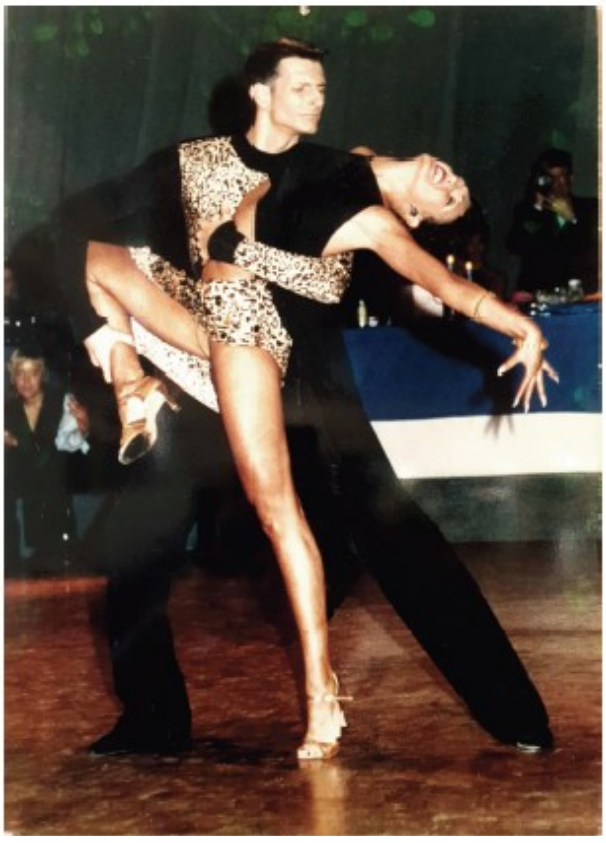
Head of Team Diablo's Physiotherapy Area
Giovanni Donadio

Social dance managers
Simone Corvini, Michela Natali

Star Cup Competition Manager
Nicola Regnoli

Syllabus Cup Competition Manager
Antonella Goffredo

Davide and Olga Cacciari



P R E M I S E

Continuous research into methodological aspects related to instruction of the most elevated techniques in dancesport have always characterised Team Diablo's activity.
Precisely in accordance with the definition of "sport", dance has been the subject of particular attention by Team Diablo, in its intuition that it required and in-depth study into the physical characteristics related to a balanced development of the motor skills required to elevate the qualities of dancers, allowing them the maximum expression of their technical quality enhancing and consolidating competition performance.
From the first studies into the motor skills required to improve performance in dancesport, the conviction put to the test was that a physical preparation based on the characteristics of the couples and, more so, the individual, is indispensable in order to extrapolate the maximum technical ability.
The first step was, therefore, to identify the principal and secondary capacities and improve them.
At this point the need arose, obviously, to measure the level of said capacities in order to evaluate and track their development in relation to the training programme carried out; and so the necessity to know how to evaluate these abilities arose.
The necessity to expand the knowledge spectrum gave the impetus for the development of the "Research and Development Centre" of Team Diablo which immediately dealt with the problem of how to evaluate its athletes, defining a number of tests and adopting advanced technological equipment for the measurement and data management of the results acquired. Furthermore, a project for the qualitative technique analysis was initiated using video analysis instrumentation; the analysis of the dancer's performance was thus born with the activation of both training methodology and dance biomechanics sections.
Successively the "Research and Development Centre" broadened the scope of its activities by activating, in collaboration with the CONI "Centre of Sports Medicine", an investigation into the performance of dancers with the aim of researching "the dancesport performance model". As part of this research, various metabolic and cardiac parameters were measured in performances carried out under competition-like conditions.
Enriched with the possession of this additional data, the managers of the "Research and Development Centre" transmitted them to Team Diablo's technical directors and teachers, beginning a process of analysis and study which allowed the realisation of training programmes increasingly targeted to the actual needs of dancesport athletes, allowing them to improve their level of performance in every aspect of the competition.
State of the art studies are orientated towards a further understanding of the performance model of dancers, seeking tests increasingly related to the characteristics of dancing and activities to improve performance skills; in fact, a series of observations relating to the metabolic parameters and proprioceptive activity are currently taking place. With regard to the latter aspect, special, new generation technological equipment which is able not only to measure proprioceptive activity, but to improve it through immediate feedback, is being used to stimulate the attention and participation of the athletes during training. With this activity there is a notable reduction in the number of ankle injuries and an increase in ankle strength as well as an improvement in relation to several performance abilities related to rapidity, strength and the expression of speed without hypertrophic effects on the muscles of the inferior limbs. The studies in this direction are particularly stimulating and the hope is that scientific data will soon back up the positive impressions that have so far impressed the Team Diablo "Research and Development" managers.
Finally, the continuous exchange of ideas and opinions between the technical directors and teachers of Team Diablo is remarkable. Lately, these discussions have moved towards finding ideal strategies for the training of new teachers with higher skills in teaching techniques, acting through modern teaching methodology allowing them to facilitate their students' learning through effective didactics based on the latest developments in neuroscience and psycho-pedagogy of teaching, and the most up-to-date training methodology.

This publication is a summary of what Team Diablo has done up until today with relative illustration of data accumulated, demonstrating the "modus operandi" which animated the team's "Research and Development Centre" and the choice of its tests, the analysis of its data, the measurements carried out in competition-like situations, the values of the parameters observed, the analyses of the data collected and finally the reflections revealed through this study and the future prospects which arose from it. Furthermore, the relative organisational models of the integrated physical-technical activity, (i.e. the intervention on both physiological and technical aspects simultaneously through the organisation of training according to the most modern indications of training methodology) are discussed in detail.

Fabio and Marina Bosco

CHAPTER ONE

The Definition of Dancesport

From a physiological point of view, dancesport was classified with sports activities "based on agility requiring considerable muscular effort" (Monte A. 1969; Lubich T. 1990), where agility-based sports are defined as those implying a prevailing coordinative component derived from a notable solicitation of the neurosensorial apparatus.
In our own view, after numerous metabolic controls and tests, modern dancesport can be defined as a technical-composite free-body couple sport, evaluated qualitatively and with notable muscular effort (that is an elevated percentage of muscle mass involved and a noteworthy amount of local muscle strength required); moreover, given that the competition is characterised by a series of dances with different metabolic requirements and divided into different phases, dancesport athletes also require a notable use of their lactic anaerobic capacity and aerobic power.

The functional model

This is the set of factors which sustain performance capacity, and can by summarised as:

- Organic-functional factors (from which we can then define the physiological performance model)
- Factors connected to motor operations (the set of conditional, coordinative, and kinesthetic factors, execution under temporal pressure, and articular mobility)
- Individual factors (age, sex, etc.)
- Anthropometric factors
- Psychological factors
- Environmental factors

The functional model is determining for the optimisation of training plans; especially, in order to deduce the subject's chances of success in the discipline, it is of fundamental importance that the physiological characteristics and the tendency of the physiological parameters during performance are defined. This will allow a certain orientation of the athlete in the choice of methods and means for the construction of an ideal training plan and the consequent achievement of competitive goals.
The model relates to an agility-based activity requiring significant cyclic and acyclic, non-stereotyped muscular effort; it is an activity requiring medium to high cardiocirculatory effort characterised by alternate phases of exertion with rapid increments up to a maximal cardiac frequency.
The physiological characteristics of the performance are characterised by the intervention of alternate aerobic-anaerobic bio-energetic mechanism due to the characteristic duration of five dances of 1'30" to 2'00", with recovery phases of approximately 30", which tend to be repeated several times during a competition.
The performance requirements are relative to:

- Qualities of physical effort: power, speed and endurance.
- Qualities of psychological effort: concentration, awareness, control, lucidity, mental endurance.
- Qualities of technical effort.

The specifications of the performance are characterised by:

- The involvement of self-control systems.
- The couple's ability to work together
- Decisional capacity
- Effort efficiency management

Performance characteristics:

- Sports activity characterised by an elevated technical requirement and precision of movement by the couple at a high physiological intensity for medium duration without breaks.
- Sports activity with immediate postural adaptation to the conditions induced by the choreographic figures and, in part, by the environment.

The construction and management of a functional model able to handle high level performances is achieved through the construction of an "adequate training programme" which stimulates improvement of the capacities and abilities in order to reach the best psycho-physical conditions and obtain performances of the highest level possible.

The state of the art in Dancesport research

In sports literature there are few works that analyze the physiological and bioenergetic aspects of dancesport; To date, they are:

- BA Blanksy, PW Reidy.,(1988) "*Heart rate and estimated energy expenditure during ballroom dancing".* Brit. J. Sports Med. 22, n°2; 57-60.
- Faina M., Bria S., Scalpellini E., Gianfelici A., Felici F.(2001) "*The energy cost of modern ballroom dancing-in Proceedings of 48th Annual Meeting of American College of Sport Medicine",* Med. Sc. Sport Exer., 5,33 (Suppl), S87
- Faina M., Bria S., Simonetto L.(2003): "*La Danza Sportiva"*. Med. Sport, 56:201-26
- Bria, S., Bianco, M., Faina, M., Galvani, C., Palmieri, V., & Zeppilli, P. (2011). *"Physiological characteristics of elite sport-dancers*". J Sport Med Phys Fit, 51(2), pp.194-203.
- Ušpurienė A.B., Čepulėnas A. (2012) *"Physical Load Intensity in Standard and Latin American Sports Dancing Programmes for Juvenile Dancers"*. Balt. J. Sport Health Sci., 2(85): 83-89.
- Zanchini A., Malaguti M. (2014) *"Energy requirements in top-level DanceSport atlete"*. J. Hum. Sport Exerc., 9(1): 148-156.
- Liiv H., Jurimae T., Maestu J., Purge P., Hannus A., Jurimae J., (2014) *"Physiological characteristics of elite dancers of different dance styles"*. European Journal of Sport Science, Vol. 14, No. S1, S429-S436
- Pilch W., Tota L., Pokora I., Głowa M., Piotrowska A., Chlipalska O., Zuziak R., Czerwińska O. (2017) *"Energy Expenditure and Lactate Concentration in Sports Dancers in a Simulated Final Round of the Standard Style Competition*". Hum. Mov., 18(2): 62-67
- Kuliś S., Sienkiewicz-Dianzenza E., Stupnicki R., (2020), *"Anaerobic endurance of dance sport atlete*", Biomedical Human Kinetics, 12, 141–148

Team Diablo orchestrated three of the above publications with its athletes thanks to the presence of the late Dr. Faina who, using Team Diablo athletes, conducted this research at the Institute for Sports Medicine at CONI, which is, still today, due to the level of the athletes tested and the use of the best equipment available, the closest to reality available in terms of actual values.

Principal research results

Evaluation of the physiological characteristics of athletes, related to functional laboratory tests: VO_2max, maxFC and lactate tests, using a maximal increment protocol until exhaustion on a treadmill. Evaluation of physiological parameters during a competition, relative to a sequence of five dances performed with 30" rest periods, the trend of the VO2 max and cardiac frequency and, at the end of each dance, the peak level of lactate produced.

The following data is taken from the research done by Blanksy et al. (1988) and refers to the values of 10 couples (see Table 1), during a competition simulation.
(N.B.: the oxygen consumption was not measured during the competition simulation, but through tests on a treadmill; the cardiac frequency was measured during the competition and the oxygen consumption was then extrapolated comparing the heart rate measurements on the treadmill and in competition: the energetic cost was derived indirectly through the relationship between the heartrate and oxygen consumption measured in the lab).

Table 1

Medium values	Standard M	Standard F	Latino M	Latino F
Heart rate (bpm)	170	173	168	177
VO2 (ml*kg-1*min-1)	42,8 ± 5,7	34,7 ± 3,8	42,8 ± 6,9	36,1 ± 4,1
Energetic cost (kj*min-1)	54,1 ± 8,1	34,7 ± 3,8	54 ± 9,6	36,1 ± 4,1

The data below is taken from research made by Faina et al. (2001) and refers to the values of 12 couples, divided into 6 Standard and 6 Latin couples during laboratory tests and a competition simulation.
In the laboratory the VO2max, maximum heart rate and lactate production were measured through incremental tests on a treadmill; the muscular power of the extensor muscles in the legs and the reuse of elastic energy through the CM Push test, a test on a leg press; and the fat and lean mass was also measured. The results of the tests are presented in Table 2 together with the anthropometric data.

Table 2

Medium values	Standard M	Standard F	Latino M	Latino F
Age (years)	19,3 ± 2,3	19,3 ± 2,9	21,3 ± 3,1	22 ± 4
Height (cm)	175,8 ± 6,6	162,5 ± 4,5	174,5 ± 5	159 ± 3
Weight (kg)	69,1 ± 5,8	52,9 ± 7,3	66,8 ± 4,77	51 ± 8
Lean mass (kg)	60,7 ± 4,1	44,1 ± 5	46,9 ± 14	30,9 ± 10,8
Fat mass (%)	11,6 ± 3	17,1 ± 1,8	9,4 ± 3,5	14,1 ± 5,5
VO2 (ml*kg-1*min-1)	60,9 ± 6	53,7 ± 5	59,2 ± 7	52,3 ± 5
VO2 (% VO2max)	68,3 ± 10	64,3 ± 7	70,5 ± 12	62 ± 6
CM push test (watt*kg-1)	17,4 ± 2	12,8 ± 1	16,5 ± 3	14,6 ± 2

In the competition simulation the VO2max, maximum heart rate and lactate production were measured. The results of the tests are presented in table 3.

Table 3

Medium values	Standard M	Standard F	Latino M	Latino F
Heart rate (bpm)	175,7 ± 8,5	179,2 ± 11,2	184,5 ± 9	182,1 ± 10,9
Heart rate (% FC max)	91,1 ± 3,5	90,7 ± 5,2	94,7 ± 4,2	95,8 ± 5,1
VO2 (ml*kg-1*min-1)	45,8 ± 6	38 ± 8,5	47,8 ± 7,2	39,7 ± 8
VO2 (% VO2max)	75,7 ± 10,6	70,8 ± 13,8	84,2 ± 11,2	72,5 ± 12,8
Peak Lactate rate (mM)	8,5 ± 2,3	8,3 ± 3,9	8,7 ± 2,5	7 ± 2,9
Accumulation after 5 dances (mM)	6,50 ± 2,1	6,91 ± 2,6	7,95 ± 2,1	6,04 ± 2,5
Difference between accumulated and base rate	4,95 ± 2,1	5,52 ± 2,4	7,95 ± 2,1	6,04 ± 2,5

The research mentioned above the values relating to the VO2 was measured and referred to the %VO2max measured in laboratory conditions in a maximal test, and the heart rate expressed as a % of its maximum measured in laboratory conditions in a maximal test; these values are shown in tables 4, 5, 6 and 7.

Table 4

Standard	Males		Females	
	HR	% HR max	HR	% HR max
Slow Waltz	157,7 ± 7,5	81,9 ± 6,1	161,4 ± 12,8	81,9 ± 5,9
Tango	173,3 ± 7	89,9 ± 2,9	175,2 ± 13,8	88,4 ± 6,6
Walzer viennese	180,6 ± 8,1	93,6 ± 2,5	183,1 ± 10,4	92,9 ± 5,3
Slow Foxtrot	179 ± 10,9	92,8 ± 36,6	182,7 ± 10,5	92,7 ± 4
Quickstep	188 ± 9	97,4 ± 2,4	193,7 ± 8,2	92,5 ± 4

Table 5

Latin	Males		Females	
	HR	% HR max	HR	% HR max
Samba	176,3 ± 14	90,5 ± 5,3	176,2 ± 10	92,2 ± 4,2
Cha Cha	184,6 ± 11	94,8 ± 2,7	182,5 ± 7,4	95,6 ± 2,6
Rumba	180,8 ± 13	92,8 ± 4,4	178,8 ± 10	93,7 ± 3,7
Paso Doble	187,4 ± 11	96,2 ± 3,4	186,7 ± 8	97,8 ± 3,2
Jive	188,3 ± 8	96,7 ± 3,3	187,7 ± 7	98,3 ± 2,8

Table 6

Standard	Males		Females	
	VO2	% VO2 max	VO2	% VO2 max
Slow Waltz	39,8 ± 7,4	66,1 ± 14,3	30,2 ± 8,6	56,3 ± 14,6
Tango	45,8 ± 6,3	75,6 ± 10,9	36,8 ± 9,6	68,8 ± 17,4
Walzer viennese	49,3 ± 5,2	81,3 ± 8,1	40,9 ± 8,6	76,3 ± 14,1
Slow Foxtrot	45,2 ± 5,4	74,6 ± 9,4	38,9 ± 7,7	72,6 ± 12,4
Quickstep	49,1 ± 5,8	81,1 ± 10,2	43 ± 8	80,1 ± 10,7

Table 7

Latin	Males		Females	
	VO2	% VO2 max	VO2	% VO2 max
Samba	47,5 ± 10	77,6 ± 22	38,4 ± 8	74 ± 16
Cha Cha	50,7 ± 6,6	90,3 ± 14	43,3 ± 8	83,5 ± 16
Rumba	46,6 ± 7	80,5 ± 11	38,9 ± 6,5	75,9 ± 13
Paso Double	48,9 ± 9,1	84,5 ± 14	43,4 ± 7,1	85,8 ± 12
Jive	47,9 ± 9,5	83,4 ± 14	42,7 ± 8	84,1 ± 12

Finally, the values of lactate at the end of each dance were measured and compared to the original measurement; in Table 8 the lactate levels at the end of each dance are displayed.

Table 8

Dance	Standard		Latin	
	Males	Females	Males	Females
1 danza	3,23 ± 0,3	3,35 ± 0,7	7,33 ± 1,6	6,59 ± 1,3
1 + 2 danze	5,12 ± 1,7	4,63 ± 1,8	8,28 ± 2,1	7,47 ± 2,1
1 + 2 + 3 danze	6,13 ± 1,3	5,4 ± 1,9	7,68 ± 1,7	7,6 ± 3,7
1 + 2 + 3 + 4 dan.	4,78 ± 1,2	5,3 ± 2,1	7,61 ± 1,3	6,84 ± 3,2
1 + 2 + 3 + 4 + 5	6,5 ± 2,1	6,91 ± 2,6	7,95 ± 2,1	6,04 ± 2,5

From an overall analysis of the research into the physiology of dancesport, it is obvious that it is a discipline which requires of its athletes extremely high aerobic and anaerobic potential, and that there is a distinction between medium and high level athletes, the latter tending to display a greater activation of their aerobic metabolisms (expressed in the higher VO2max values), due to a higher level of training and with positive consequences especially in the recovery phase which influences each successive dance with lower heart rate values and therefore a relative freshness in relation to dancers of medium level.
From further research made by Faina, Bria and Simonetto in 2003, the aerobic potential of dancers is compared to that of athletes of other disciplines; in the following table 9a the values relating to male dancers are presented whereas table 9b refers to the female dancers' values. In each table the values for both standard and Latin American dancers are expressed.

Table 9a

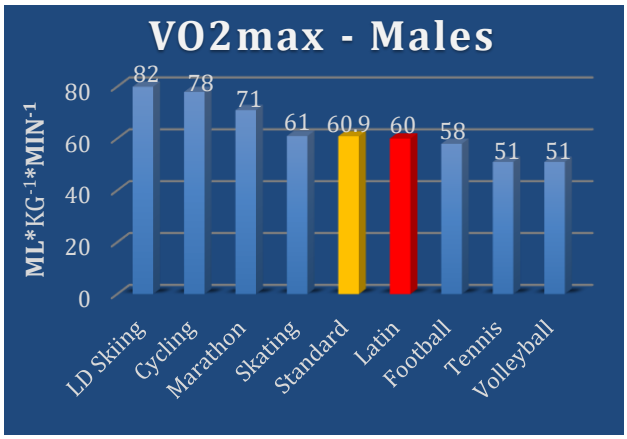
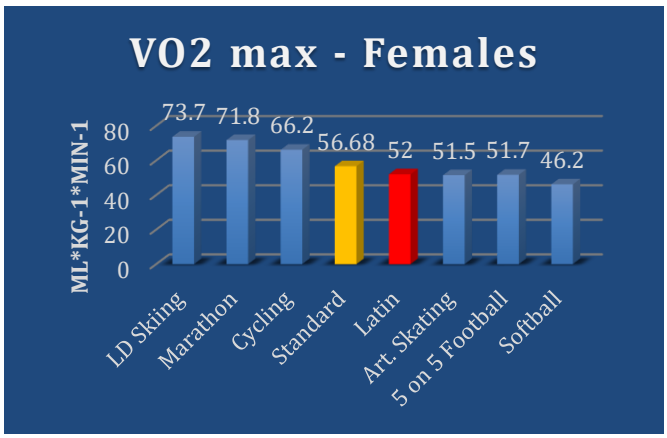


Table 9b



The values of the extensor muscles of the legs were also compared to athletes in other disciplines, and in Table 10a the male dancers' values are compared to those of males in other sports and likewise in Table 10b for female dancers. Once again, the values for both standard and Latin American dancers are expressed.

Table 10a

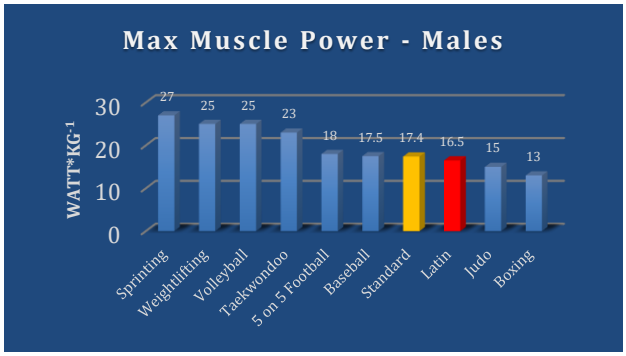
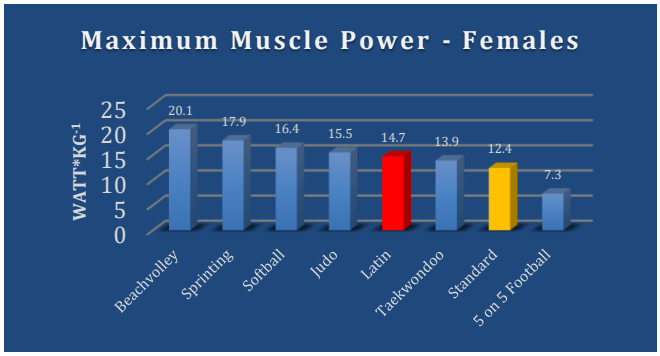
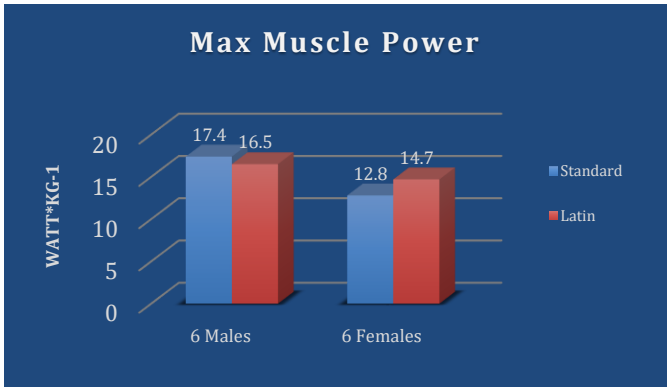


Tabella 10b



In the following Table 11 the medium values for muscular power of dancesport athletes are displayed, again divided for gender and style.

Table 11



In Table 12 below, the values reported by Faina et al. (2001) in their research of the maximum aerobic power expressed in terms of maximum oxygen consumption (VO2max) in different sports are shown; in the following Table 13 the values reported (within the same research project) of the muscular potential of the lower limbs during countermovement jump test expressed in Watt/kg in different sports are displayed. The data regarding other sports come from the database of the Institute of Sports Medicine (Italian National Olympic Committee [CONI], Rome, Italy), whereas the data for standard and Latin American measured during the research are shown on the last row of the table.

Table 12

Sport	Level	VO2max (ml/Kg/min)
Contemporary Dance	Professional	49,1
	Student	39,2
Ballet	Professional	42,2
	Student	40,8
Gymnastics		49,6
Football		50
Marathon		77
Volleyball		46,5
Swimming		58
Inactive subjects		44
Dancesport	Male Standard Dancers	60,9 ± 6
	Female Standard Dancers	53,7 ± 5
	Male Latin Dancers	59,2 ± 7
	Female Latin Dancers	52,3 ± 5

Table 13

Sport (number of athletes)	Male	Female
Tennis (10 M e 10 F)	22,8	17
Taekwondo (10 M e 10 F)	21,9	16,3
Judo (10 M e 10 F)	16,9	16,1
Baseball (10 M e 10 F)	19,5	16,1
Pentathlon (10 M e 10 F)	20,7	15
Fencing (10 M e 10 F)	22,8	13,8
Dancesport (12 M e 12 F)	18	13,4

Overall Conclusions of the Research

Standard dancing: there are different energetic requirements for each dance;

- The most elevated VO2 values are reached in the 3rd and 5th dance (Viennese Waltz and Quickstep), in which the anaerobic metabolism participates to a high degree.
- At a glycolytic level, the activation of this mechanism in the first dance is elevated and it is not certain if this is due to late activation of the aerobic metabolism of if the Slow Waltz is a dance that required a great deal of energy; the values are similar to the Tango (the 2nd dance) and the Viennese Waltz (the 3rd dance), while in Slow Foxtrot (the 4th dance) the levels diminish together with the Heart Rate and the VO2 which suggests a low energetic requirement (possibly a recovery type condition in preparation for the 5th and final dance). In the Quickstep (the 5th dance), the Heart Rate and VO2 increase again and lactate is accumulated, reaching the highest level of the entire sequence.
- Observations in difference in gender: no difference in terms of the VO2 values was found between sexes in Standard dancing, apart from in the first and second dance, which suggests that the female plays a less active role than the male in these two dances.

Latin American dancing:

- It seems that there is a high involvement of the aerobic cardiovascular metabolism, with lower values in terms of both heart rate and VO2 only in the Samba (1st dance) where the inertia of the cardiovascular system and aerobic system should be taken into consideration.
- At a glycolytic level, the activation of this mechanism in the Samba (1st dance) is elevated with a significant accumulation of Lactate, of which high levels tend to persist in the following four dances without further accumulation.

Differences between the dances:

- The Latin dances seem to require a higher production of energy from the aerobic and anaerobic paths in relation to Standard dancers as suggested by the significant differences observed “on the field” in terms of heart rates and VO2.

Physiological Characteristics:

- Physical activity alternated with active phases of medium duration and brief recovery periods during which the aerobic and anaerobic systems are put under strong pressure.
- Furthermore, in the Latin American section, the energetic requirements seem higher than those in Standard. The data collected suggests that in dancesport, in line with other aesthetic sports (e.g. gymnastics), the performance is enhanced by advanced physiological capacity.

Performance Model:

- Because Dancesport is prevalently a type of intermittent exercise, in which explosive moments of action are alternated with others which require precision and ability, dancers would further

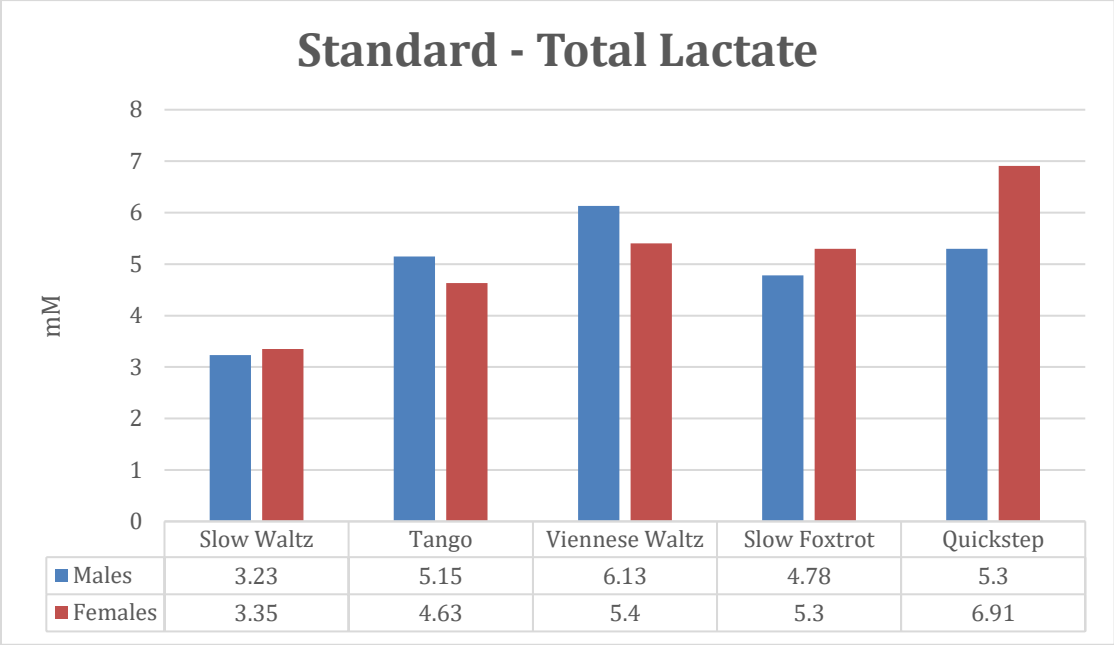
benefit from a sound aerobic base, whereas a higher resilience to high concentrations of Lactate would limit the deleterious effects of an accumulation of metabolites in activities which require balance, control and coordination.

- It is important to highlight that dancesport athletes have artistic, technical and physical requirements to fulfil during a competition.

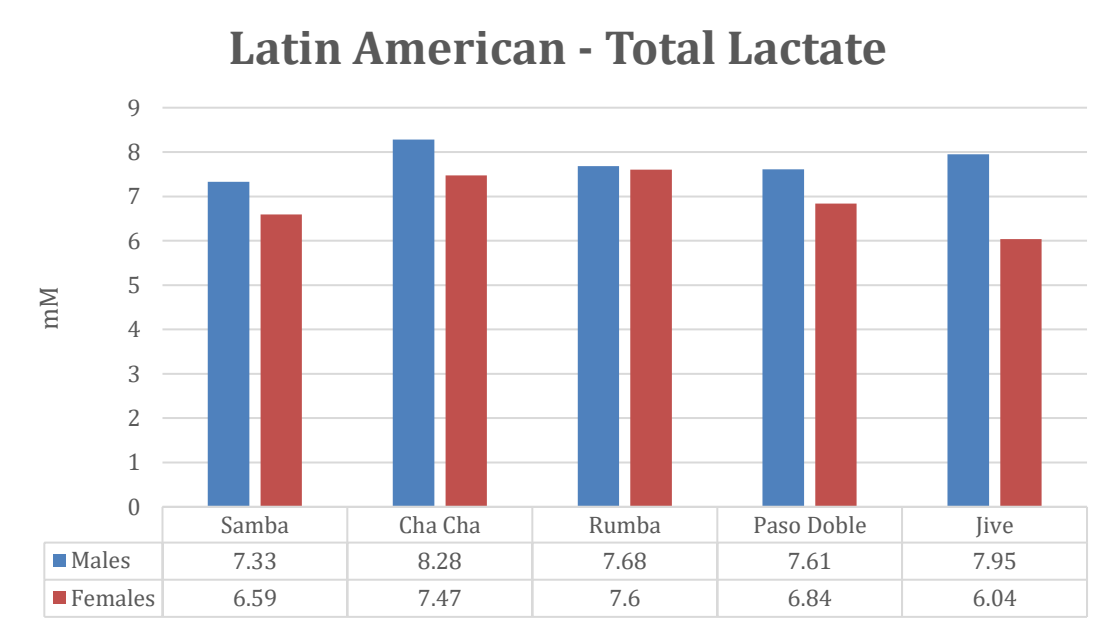
Discussion

Tables 14 and 15 display the registered levels of lactate at the end of each dance according to the research project above and previously shown in Table 8, both for Standard and Latin American dancers.

Tables 14 e 15



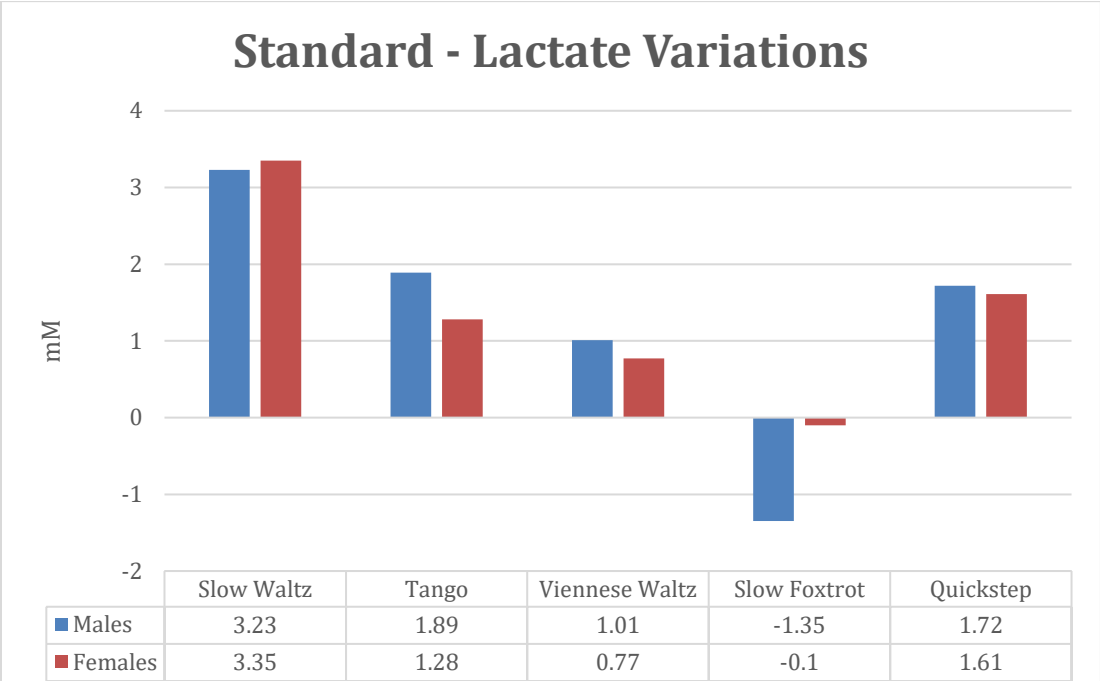
	Slow Waltz	Tango	Viennese Waltz	Slow Foxtrot	Quickstep
Males	3.23	5.15	6.13	4.78	5.3
Females	3.35	4.63	5.4	5.3	6.91



	Samba	Cha Cha	Rumba	Paso Doble	Jive
Males	7.33	8.28	7.68	7.61	7.95
Females	6.59	7.47	7.6	6.84	6.04

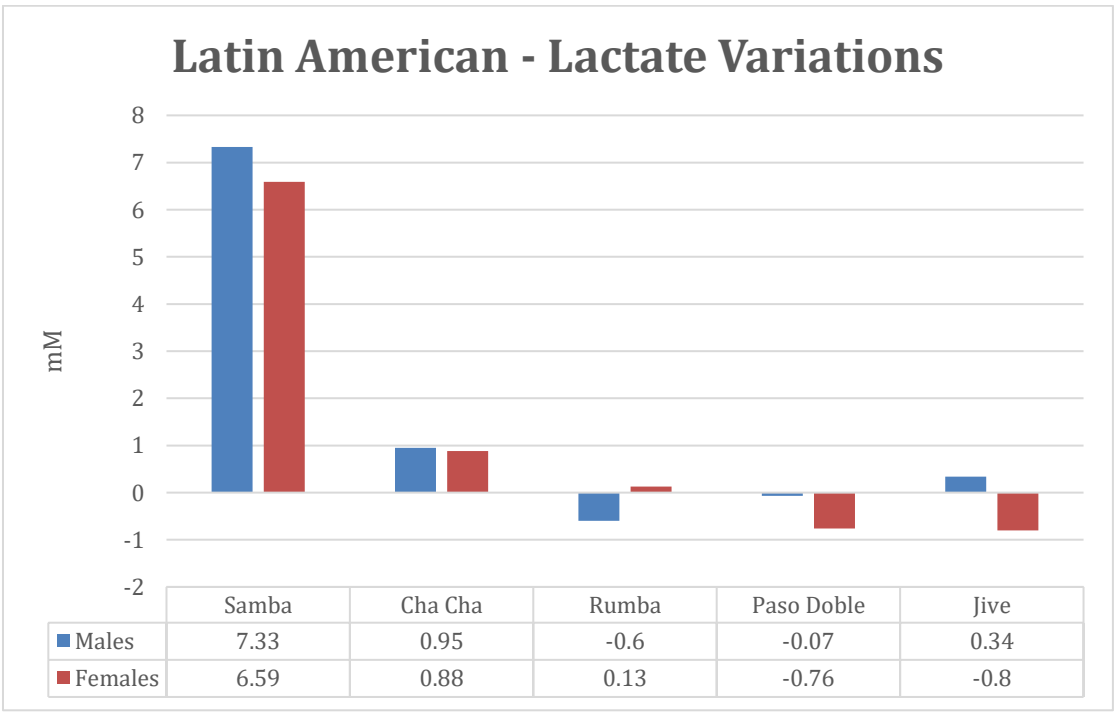
Investigating the difference between the peak lactate values after each dance, the derivate variations between one dance and another in their successive competition order are shown in tables 16 and 17 below.

Table 16



	Slow Waltz	Tango	Viennese Waltz	Slow Foxtrot	Quickstep
Males	3.23	1.89	1.01	-1.35	1.72
Females	3.35	1.28	0.77	-0.1	1.61

Tabella 17



	Samba	Cha Cha	Rumba	Paso Doble	Jive
Males	7.33	0.95	-0.6	-0.07	0.34
Females	6.59	0.88	0.13	-0.76	-0.8

From this simple data anlysis and considering the values of the other parameters considered in the research project (VO2, Energetic Cost, Heart rate), several observations and considerations can be noted.

Standard dances:

1. Slow Waltz: The lactate production observed is higher than expected given it is the first dance and the energetic cost is a lot lower that the other dances; this is probably due to an insufficient warm-up or at least inadequate to the level of effort required, thus causing a delay in the activation of the aerobic metabolism.
2. Tango: the energetic requirement is lower and therefore the lactate production in this dance is less than that of the previous dance.
3. Viennese Waltz: this dance has a high energetic cost (the second-highest out of all five dances), but a modest lactate production, probably due to the enormous intervention of the aerobic metabolism to support the effort.
4. Slow Foxtrot: This dance has the lowest energetic cost, the lowest VO2 and the lowest peak heart rate demonstrating a significantly lower effort requirement and consequently the lactate levels tend to diminish. This is almost definitely a dance in which the dancers "recover" during the performance in preparation for the last dance.
5. Quickstep: At the end of this dance the lactate levels reach the highest peak of all five dances, indicating an elevated anaerobic and muscular (power) requirement; together with the Viennese Waltz, this dance has the highest levels of VO2 and is considered the most strenuous dance overall, taking into account the fact that it is the last dance in the competition sequence.

Latin American dances:

1. Samba: This seems like a photocopy of the first standard dance and similar comments can be made. The lactate production is elevated given that it is the first dance and that its energetic cost is lower than other dances; this is probably due to an insufficient warm-up or at least inadequate to the level of effort required, thus causing a delay in the activation of the aerobic metabolism.
2. Cha Cha Cha: The high level of VO2 (the highest of all five dances) demonstrates that this is a dance with an elevated aerobic energetic requirement and the high lactate level peaks at the highest level for the entire final.
3. Rumba: for male dancers this dance has the lowest value; the energetic cost, VO2 and heart rate all demonstrate a lower effort requirement and even the lactate levels tend to diminish. The trend is similar in female dancers but less obviously than in their male partners. This is definitely a dance which allows the athletes to "recover" before facing the last two dance tests.
4. Paso Doble: The VO2 level returns to an upward trend and it the aerobic energy expenditure in this dance is high, but the male dancers have a stable lactate level, and ladies' levels tend to drop; the dancers practically maintain the same "condition" as the previous dances, ready for the final dance.
5. Jive: The VO2 level remains elevated and the lactate level increases in male dancers, indicating that Jive requires an elevated effort both aerobically and anaerobically and also in terms of muscle power; in females, on the other hand, the lactate level tends to diminish demonstrating a lower effort than the male partners.

As stated at the end of this publication, in light of new and more recent observations and as a result of new and more incisive training protocols, the observations and data reported above seem to deviate from new and more up-to-date data. The use of new and more modern training methodologies has unquestionably influenced the performance of modern athletes, who demonstrate different values.

CHAPTER TWO

Team Diablo's Research and Development Centre's Activity

Team Diablo's Research and Development Centre was born out of the necessity to expand knowledge about dancesport and to therefore bring a scientific edge to the study of this discipline, with the goal of supplying better support to the teachers and athletes adapted to their needs. This centre relies on collaboration with numerous professionals from inside and outside the world of dance, all of whom are involved in the study of every aspect of this sport. Team Diablo Lab lies within the R&D Centre and is the most advanced in the world in the field of dancesport for performance analysis and the study of advanced and innovative training methodology

The goals of the centre are:

- To study and analyze competition performance and all forms of training.
- Give indications for the improvement in technical actions and "suggest" corrections to achieve better technical performances.
- Provide methodological insights appropriate to the characteristics of each athlete to improve their psycho-physical condition.

The essential function of Team Diablo Lab is "competition analysis", differentiated between:

  - Quantitative analysis
  - Qualitative analysis

The derived functions of the quantitative analysis can be traced back to four essential points:

- Scope of quantitative analysis:
  - Tests, form and condition analysis, performance analysis, study of motion through video recordings
- Post-term analysis:
  - Movement correction
  - Indications for more effective training
- General analysis results:
  - Improvement of actions, improvements in motor capacities and abilities, translating into improvments in technical actions
- Specific analysis results:
  - Performance improvement

The derived functions of qualitative analysis can be traced back to four essential points:

- Scopes of qualitative analysis:
  - Analysis of technical actions
  - Performance analysis
  - Study of motion through video recordings
- Post-term analysis:
  - Movement correction
  - Indications for more effective training
- General analysis results:
  - Improvement of actions, improvements in motor capacities and abilities, translating into improvments in technical actions
- Specific analysis results:
  - Performance improvement

In order to reach these goals, the Team Diablo Research and Development Centre divides these tasks into three thematic areas and this is reflected in its internal organisation:

- Evaluation
    - Physiological aspects
    - Biomechanical aspects
    - Technical aspects
- Guidance for programming
    - Physical aspects
    - Technical aspects
- Education
    - Team Diablo teaching staff
    - Academy
    - Institute

The evaluation focuses on the study of three aspects:

- Physiological aspects
    - Objective exams
    - Nutritional aspects
    - Analysis of energy expenditure through heart rate monitors
- Biomechanical aspects
    - Tests based on the study of motor capacity with data collection through sophisticated equipment: conductometry platform, optojump
    - Motor tests using heart rate monitors
- Technical aspects
    - Subjective exams
    - Video analyis to search for technical errors

The need to know and understand motor capacities in relation to dancesport and how to improve them gave impetus to the centre and, after a period of preliminary study based on the research data available in the scientific field and on Team Diablo's internal experience, established the need to develop a series of tests to evaluate these motor capacities in dancesport athletes and, using these results, acted on specific rather than generic aspects of the performance, operating using working protocols constructed around the characteristics of each athlete who, after continuous monitoring, demonstrated modified parameters which better reflected the right balance for improved performances.

Thus, the Team Diablo performance model was developed, allowing our athletes to express their capacities to their maximum and to… achieve glory.
The performance mode was constantly enriched during its evolution thanks to more advanced technology which allow better study of the performance and helping athletes to fulfil the performance requirements of the discipline.

The future prospects of Team Diablo's Research and Development Centre regard the same aspects with more and more accurate insights into dancesport performance.
Regarding performance evaluation the following developments have been included:

- Physiological aspects
    - Advanced nutritional examination
    - Calculation of energy consumption and cost, using VO2 analysis
    - Effort analysis using heart rate monitors and heart rate analysis software
- Biomechanical aspects
    - Tests aimed at the study of motor skills in addition to the equipment already in use, specifically: accelerometers, electronic proprioceptive platforms

    - Performance analysis during tests and exercises
    - Motor tests with heart rate monitor and heart rate analysis software
- Technical aspects
    - Subjective exams
    - Optometric analysis of recordings in search of technical errors, and correction control with simultaneous comparisons with dancing actions using specific software

This represents an epochal change in the state of the art relative to:

- Physical aspects: with generic tests
- Technical aspects: with limited correction

Future prospects (some of which are already active) which will allow us to have:

- Better and more complete indications for programming improvement through new tests
- More and better corrections using new analysis techniques

In terms of indications for better training programmes, advice was initially given for improvements of both physical and mental aspects based on control activities and tests (at the time these were somewhat generic), meaning substantially that the methodology used and indicated was approximate at the time, especially in relation to the status quo. Today, thanks to the in-depth studies carried out and the technological evolution of the equipment used, these indications have been enriched with data, corrections and ideas which conduct us ever closer to the requirements of modern dancesport.

Finally, regarding Education, there has been a true revolution. Initially, non-institutionalised study was the norm for dance teachers and was mostly improvised and based on the desire and interest of the individual. If the goal is to create a real school for teachers based on shared values, technique, and scientific knowledge, such an organisation (or lack of) is inadmissible.

Therefore, an education centre for dancers and teachers based on two levels was created:

- The Dancesport Institute
- The Dancesport Academy

The internal programme provides for a transition for each student from the Institute to the Academy after a minimum of three years of study and achieving certain results in exams, whereas the Academy is a source of continuous education. Within the Academy the subjects studied are inherent to the full and complete formation of a dancesport teacher.

The future holds an epochal change from a preparation for generic dancing teachers to the education of specialist technicians with competencies in differing areas relative to:

- Initiation into dancesport for youth with skills in physical development and technique
- Initiation into dancesport for adults with skills in physical consolidation and technique
- High performance dancesport with skills in the specialisation of training methodology

What are the fundamental points? They can be summed up in three main areas:

1. Knowledge transmission
    - Metholodogy of sports teaching
2. Transition of knowledge to skills
    - Strategy of sports teaching
3. Learning and consolidation
    - Methodology of sports training

The first of these areas is strongly influenced by fundamental elements of the social sciences applied to sport, specifically:

- Psychology
- Educational and didactic science
- Sociology
- (not to mention neuroscience and theory of training)

The second area is strongly interdisciplinary with multiple contributions from various disciplines, such as:

- Psychology
- Education and didactic science
- Sociology
- Theory and methodology of training
- Biomechanics
- Disciplines relating to biology and medicine

The third area is also strongly interdisciplinary with multiple contributions from various disciplines, such as:

- Theory and methodology of training
- Biomechanics
- Physics and Chemistry
- Disciplines relating to biology and medicine
- General and Information Technology
- Psychology

This system of areas, even though complex, is necessary for the construction of models for the application of the correct methods for teaching technique and tactics.

The goals can be reduced to two main themes:

- Acquiring the necessary competencies to be able to perform dancesport
- Acquiring the psycho-physical characteristics to be able to perform dancesport

Therefore:

- Facilitate technical and tactical learning
- Optimise the relationships with and between athletes
- Promote, develop and guarantee the ethical character of the sport and the role of the teacher.

In synthesis, the goal of the modern education requires the teachers to:

- Know the recipients of the message
- Know the methodology of training
- Possess valid technique teaching methods
- Know how to communicate
- Know how to manage athletes and/or groups

It is clear that the methodologic direction taken in the education of teachers within Team Diablo follows the dictates of modern psycho-pedagogy and is oriented towards a modern vision of a complete dancesport teacher whose knowledge is not limited to just that of the technique.
The following is a brief description of the first research project run by the Research and Development Centre named “An investigation into some of the characteristics of dancesport athletes” and was oriented towards knowing the characteristics of dancesport athletes though the use of a series of tests which, over time, has been enriched with new exams and electronic equipment. A secondary goal of

this research was to investigate eventual differences between athletes who perform the Standard dances and those who perform Latin American.
A second research project bearing the title “Investigation into the heart rates during competition conditions” was oriented towards knowing the characteristics of dancesport athletes, measuring their heart rates during a five dance competition simulation where each dance lasted 1’30” and there was a 30” break between dances; the heart rate monitoring continued after the end of the last dance for 3’ and data points were taken every 30” to evaluate the dancers’ recovery.

The results of these two projects are summarised below.

Paolo Bosco and Silvia Pitton

Luca Bussoletti and Tjasa Vulic

Investigation into some of the characteristics of dancesport athletes

Two groups of subjects (one Standard group and one Latin made up of 10 males and 10 females) were measured anthropometrically and subsequently subjected to several tests using a conductometry platform; from the analysis of the results of these tests, several differences were noted which guided the development of working protocols for our dancers.
The statistical analysis used to verify eventual differences between the anthropometric characteristics of the two groups and in the motor capacities involved the definition of variables beforehand.
Independent variables were derived from the two groups and gender of the participants, therefore:

- Standard (males and females together)
- Latin American (males and females together)
- Male Standard dancers
- Female Standard dancers
- Male Latin dancers
- Female Latin dancers

The dependent variables represented by the anthropometric characteristics of the tests, and therefore:

- Age
- Height
- Weight
- Squat Jump with hands on hips
- Counter Movement Jump with hands on hips
- Counter Movement Jump with free arms
- BMI
- % elasticity of the lower limbs
- % coordination between the lower and upper body

Investigative Protocol
The investigative protocol started with the recruitment of 40 subjects (20 males and 20 females) who were first subjected to anthropometric measurement and successively to several movement tests. At the end of the tests statistical analysis was made:

- A descriptive statistical analysis of the values of the different groups
- A comparative statistical analysis of the values of the groups as a whole
- A comparative statistical analysis of the values of the groups compared to one another

Method

- Sample
  40 subjects divided into groups of male and female dancesport athletes
- Description of the groups
  The groups were divided into:
  - Standard: a group made up of 10 males and 10 females
  - Latin American: made up to 10 males and 10 females
- Data collected
  The following data was recorded:
  - Age
  - Height
  - Weight

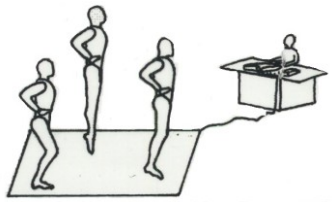
  From these data the Body Mass Index (BMI) was derived.
  The data relative to the evaluative tests was then collected.

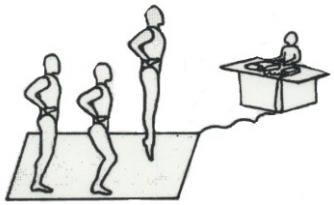
- Evaluation tests

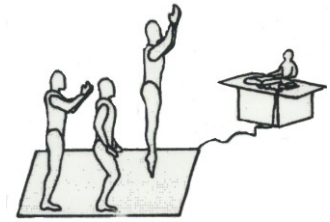
Three vertical jump tests using the Optojump platform were performed which measures the flight time of every jump and transforms this measurement into the maximum height reached by the barycentre of the subjects; the tests looked into:

1. Explosive power of the lower limbs through the Squat Jump (SJ) test, performed with a single jump from a held squat position with the legs bent at 90° and the hands held still on the hips for the entire duration of the exercise.
2. Explosive-elastic power of the lower limbs through a Counter Movement Jump (CMJ) test, performed starting from a standing position, then bending the knees to a 90° angle, and immediately jumping upwards, with the hands held on the hips for the entire duration of the exercise.
3. Explosive-elastic power of the lower limbs with the added use of the arms through a Counter Movement Jump with free arms (CMJB), performed starting from a standing position, then bending the knees to a 90° angle and immediately jumping upwards, with the free movement of the arms accompanying the body during the exercise.

The data collected from the SJ and CMJ provided the percentage of elasticity of the lower limbs (% elasticity), and those collected from the CMJ and CMJB allowed the derivation of the percentage values of the leg-arm coordination (% coordination).

SJ	Description	Data Measured
	The subject stands on the platform with hands on hips, the upper body erect and the knees bent 90°. From this static position a jump is made without moving the hands	The maximum height reached with the barycentre is measured in cm; this measurement is calculated by the computerised mechanism Ergojump

CMJ	Description	Data Measured
	The subject stands with hands on hips, torso erect and legs straight; then the legs are bent to 90° and, extending them quickly, a vertical jump is made without moving the hands.	The maximum height reached with the barycentre is measured in cm; this measurement is calculated using the computerised “Ergojump” mechanism. The difference in height of the CMJ in relation to the SJ is calculated and expressed as a percentage.

CMJB	Description	Data Measured
	The subject stands with erect torso and straight legs, then, bending the legs to 90° and, extending them quickly, a vertical jump is made together with a swing of the arms.	The maximum height reached with the barycentre is measured in cm; this measurement is calculated using the computerised “Ergojump” mechanism. The difference in height of the CMJB and the CMJ is calculated and expressed as a percentage.

- Equipment
  The tests were executed using the Optojump platform with photo-cellular detection of flight time and the transformation of this data into the maximum height reached by the barycentre of the test subject.
  The data was collected, processed and ordered using the Excel computer programme, and analysed using Stat View, a statistical analysis programme installed on an Apple MacIntosh Power 6500; the treatment and successive analysis was performed using an Apple MacIntosh Imac.
- Statistical method used
  The contemporary analysis between groups was executed using the Kruskal-Wallis test.
  The analysis of the two groups was executed using the Mann-Whitney test.
- Data processing during the investigation
  The data collected were those relative to the anthropometric characteristics and the jump tests.
  The values collected for each individual jump were based on the following parameters:
  - Flight time in milliseconds
  - Jump height in cm

  The data collected were ordered and divided based on speciality and gender.

The analysis of the test statistics provided the following conclusions:

In the comparative Kruskal-Wallis test between the 4 groups analysed together the results of each single parameter were as follows:

- **Age, % elasticity, % coordination:** the hypothesis of no difference is accepted at a threshold of P.10 and therefore there is no significant statistical difference between the values of the four groups.

- **Age, Weight, SJ, CMJ, CMJB:** the hypothesis of no difference is refused at the threshold of P.01 and therefore there is a significant statistical difference between the values of the four groups.

In the comparative Mann-Whitney test between two groups at a time the results of each single parameter were as follows:

Comparison Male Standard Dancers – Female Standard Dancers:

- **Age, % elasticity:** the hypothesis of no difference is accepted at a threshold of P.10 and therefore there is no significant statistical difference between the values of the two groups.
- **% coordination:** the hypothesis of no difference was refused at a threshold of P.10 and accepted at the threshold of P.05.
- **Height, Weight, SJ, CMJ, CMJB, BMI:** the hypothesis of no difference is refused at the threshold of P.01 and therefore there is a significant statistical difference between the values of the two groups.

Comparison Male Latin American Dancers – Female Latin American Dancers:

- **Age, % elasticity, % coordination:** the hypothesis of no difference is accepted at a threshold of P.10 and therefore there is no significant statistical difference between the values of the two groups.
- **Height, Weight, SJ, CMJ, CMJB, BMI:** the hypothesis of no difference is refused at the threshold of P.01 and therefore there is a significant statistical difference between the values of the two groups.

Comparison Male Standard Dancers – Male Latin American Dancers:

- **Age, Height, Weight, SJ, SMJ, CMJB, BMI, % elasticity, % coordination:** the hypothesis of no difference is accepted at a threshold of P.10 and therefore there is no significant statistical difference between the values of the two groups. For the data points regarding **Height** (P.12 threshold), **Weight** (P.11 threshold), and **% coordination** (P.014 threshold), the hypothesis of no difference is very close to the P.10 limit and therefore these parameters are very close to producing a significant difference.

Discussion

The analysis of the results notes a general non difference between the groups, but the number of subjects is relatively limited as is the number of tests and it is therefore difficult to make conclusive affirmations especially considering that the subjects who underwent the tests were not all high-level athletes and had been training for a limited amount of time.

Conclusions

It is not possible to make absolute assumptions about eventual differences between the motor capacities of the subjects belonging to the two groups of dancers and further investigation is necessary (a true and full research) in order to analyse the characteristics of the two specialities in depth.
There are situations which suggest possible differences between groups at high level and it is necessary to do wider research into motor capacities.

Team Diablo Administrative Offices

Investigation into the heart rate frequencies in competition conditions

Two groups of test subjects (one Standard group made up of 11 couples and one Latin group made up of 18 couples) were involved in this study where anthropometric measurements were taken before observatory tests using heart rate monitors and a remote data collection system; the subsequent analysis of this data revealed several differences which then guided working protocols for our dancers.
No statistical investigation was performed but the differences between the groups are obvious.

Method

- Sampling
  58 individuals were chosen and divided into groups of male and female dancesport competitors
- Group description
  The groups were made up of:
  - Standard: 11 males and 11 females
  - Latin American: 18 males and 18 females
- Data collected
  The following data was collected:
  - Age
  - Height
  - Weight

  From which the Body Mass Index (BMI) was derived.
  Data from the results of heart rate observations were then collected.

In table 18 the values relative to the groups' characteristics and anthropometric data is shown.

Table 18

	Female Latin Group	**Male Latin Group**	**Female Standard Group**	**Male Standard Group**
N° of dancers	18	18	11	11
Ages	21,67 ± 7,84	23,72 ± 7,72	24,36 ± 6,82	26,00 ± 6,28
Height (m)	1,63 ± 0,06	1,76 ± 0,05	1,64 ±0,09	1,77 ± 0,08
Weight (kg)	50,14 ± 3,94	67,67 ±11,30	51,91 ± 6,16	66,45 ± 6,07
BMI	18,87 ±1,65	21,85 ± 2,88	19,41 ± 2,01	21,17 ± 1,14

In table 19 the heart rate trends during a test in which the duration of each dance was 1'30" and the recovery time between dances was 30" are displayed; as shown, the heart rates were monitored continuously for 3' after the end of the final dance, with data points registered every 30" to evaluate the recovery trend.

Table 19

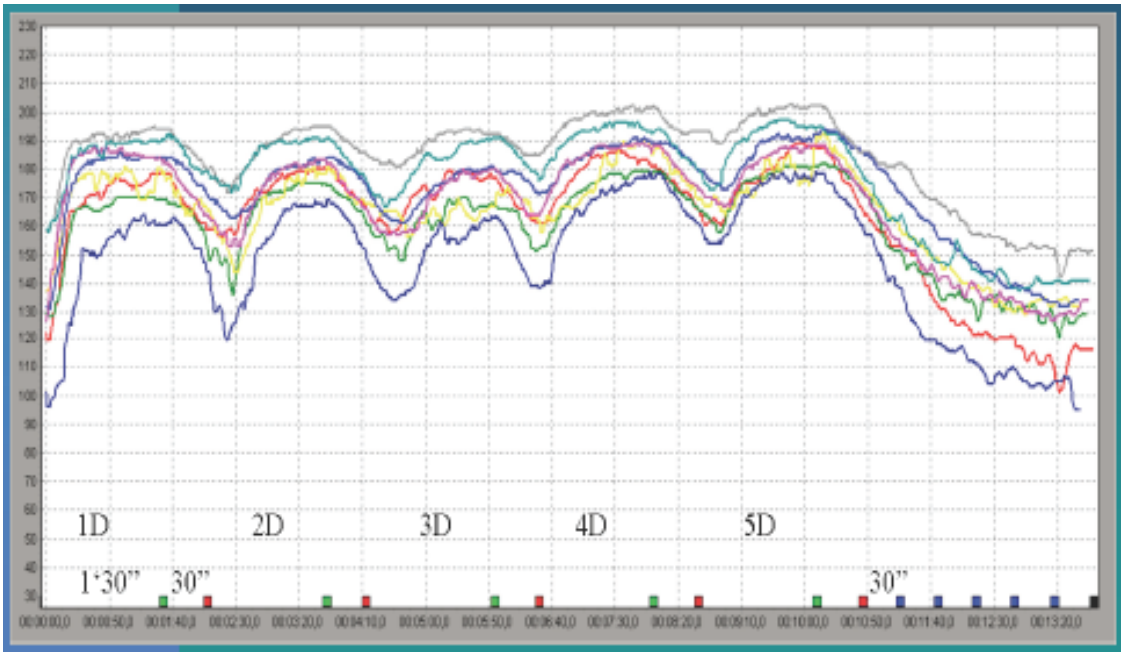


Table 20 contains the values relating to the following parameters:

- Maximum Heart Rate of each subject
- Peak Heart Rate reached during the test
- % of the peak heart rate in relation to Maximum Heart Rate
- Medium heart rate at the end of the 1'30" dances
- % of the medium heart rate at the end of each dance in relation to the Maximum Heart Rate
- Heart Rate at the end of the test
- Heart Rate after 2' recovery
- % Decrease in Heart Rate at the end of the test and after 2'

Table 20

	Female Latin Group	**Male Latin Group**	**Female Standard Group**	**Male Standard Group**
Maximum Heart Rate	204,3 ± 7,84	196,3 ± 7,72	201,6 ± 6,82	194 ± 6,28
Peak Heart Rate during test	191,2 ± 7,63	185,4 ± 7,35	192,2 ± 6,35	188,3 ± 9,35
% of Max HR	93,6 ± 3,29	94,5 ± 3,87	95,4 ± 3,86	97,1 ± 4,62
Medium HR at end of dance	184,4 ± 9,18	177,9 ± 7,43	182,5 ± 6,59	177,5 ± 9,19
% of Max HR	90,3 ± 4,4	90,7 ± 4,13	90,6 ± 3,43	91,5 ± 4,69
Final HR	190,9 ± 7,45	185,4 ± 7,35	192,2 ± 6,35	188,3 ± 9,35
HR 2' after end of test	134,2 ±10,12	132,7 ± 11,09	131,1 ± 14,82	125,8 ± 7,69
Δ% end-2'	29,4 ± 4,19	28,4 ± 5,94	31,8 ± 7,09	33,15 ± 2,78

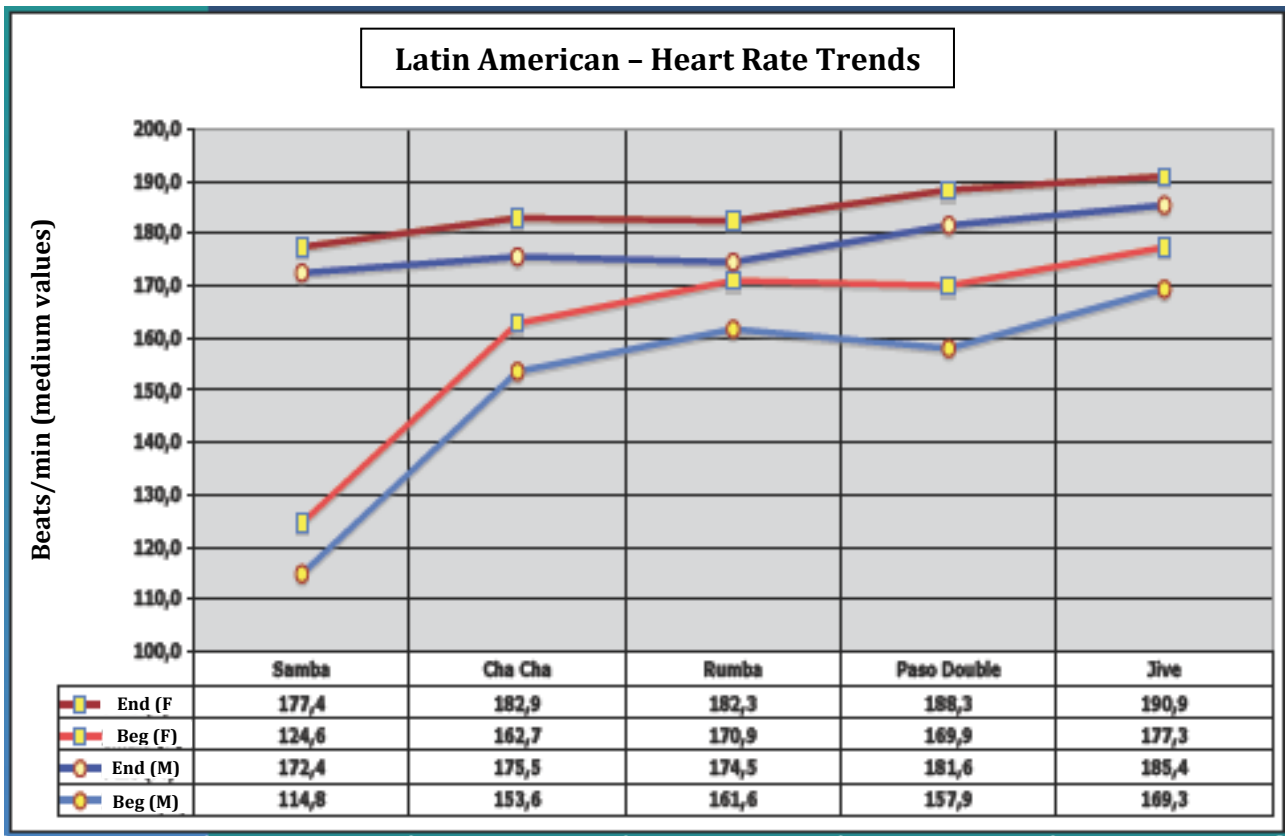
In table 21 the Heart Rates at the end of each dance expressed as % of Max HR for the Latin group divided for male and female results.

Table 21

	Female Latin Dancers		Male Latin Dancers	
	HR end of dance	**% max HR**	**HR end of dance**	**% max HR**
Samba	177,4 ± 21,2	86,91 ± 10,5	172,4 ± 9,34	87,91 ± 4,91
Cha Cha	182,9 ± 8,57	89,55 ± 3,68	175,5 ± 9,34	89,50 ± 5,10
Rumba	182,3 ± 8,79	89,30 ± 4,29	174,5 ± 7,20	89 ± 4,20
Paso Doble	188,3 ± 8,40	92,20 ± 3,93	181,6 ± 6,69	92,59 ± 3,89
Jive	190,9 ± 7,45	93,50 ± 3,22	185,4 ± 7,35	94,53 ± 3,87

The trends of the heart rates registered at the beginning and end of each dance and the % in relation to the maximum heart rate are shown in table 22.

Table 22



% max F	86,91	89,55	89,30	92,20	93,50
% max M	87,91	89,50	89,00	92,59	94,53

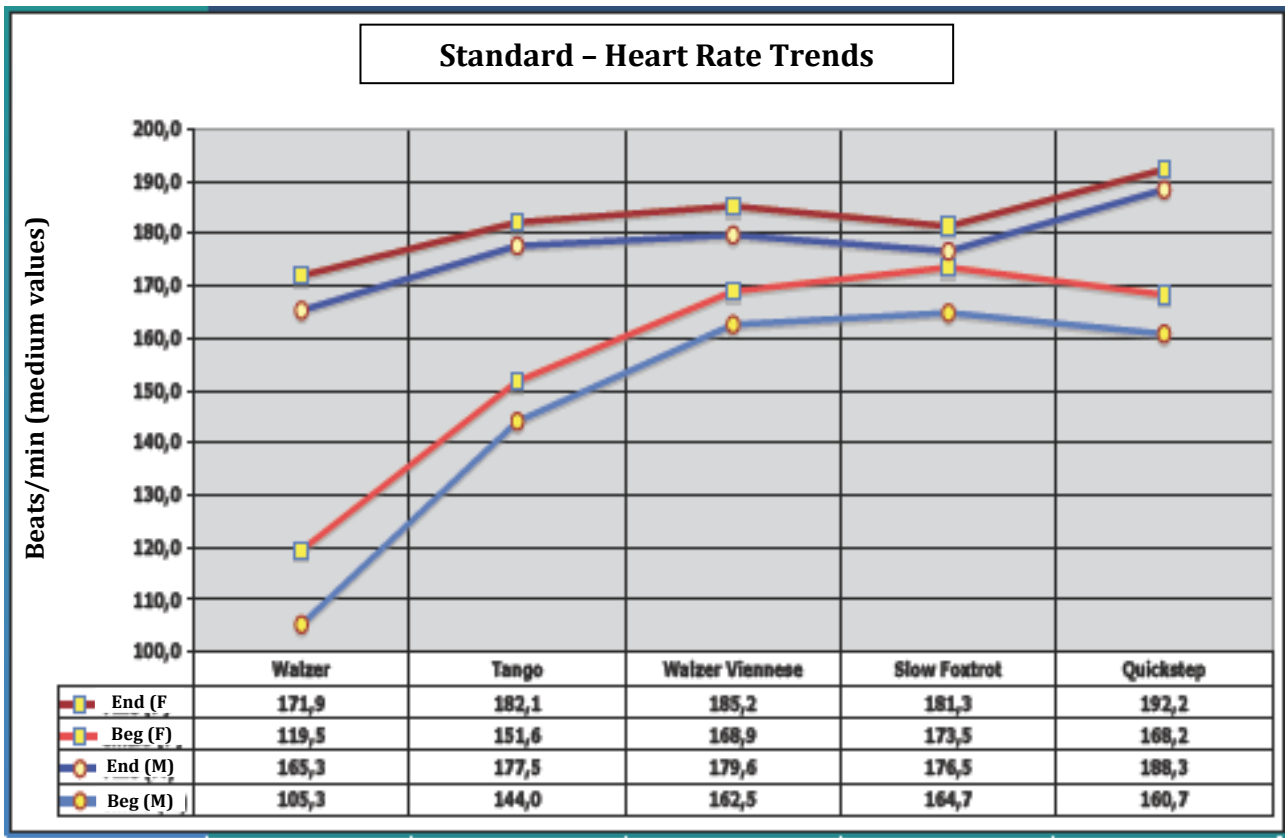
In table 23 the heart rate values at the end of each dance and the same data expressed as a % of the max Heart Rate is displayed according to gender.

Table 23

	Female Standard Dancers		Male Standard Dancers	
	HR end of dance	**% max HR**	**HR end of dance**	**% max HR**
Slow Waltz	171,9 ± 77,5	85,30 ± 3,85	165,3 ± 9,34	85,24 ± 4,94
Tango	182,1 ± 6,17	90,37 ± 3,49	177,6 ± 9,20	91,56 ± 4,75
Valzer Viennese	185,2 ± 6,75	91,89 ± 3,44	179,6 ± 9,91	92,63 ± 4,98
Slow Foxtrot	181,3 ± 8,15	89,94 ± 3,72	176,6 ± 9,68	91,04 ± 4,84
Quickstep	192,2 ± 6,35	93,59 ± 3,86	188,3 ± 9,35	97,08 ± 4,62

The trends of the heart rates registered at the beginning and end of each dance and the % in relation to the maximum heart rate are shown in table 24.

Table 24



% max F	85,30	90,37	91,89	89,94	95,39
% max M	85,24	91,56	92,63	91,04	97,08

Examples of the first models used for the analysis of heart rate data during dances

Test date:	10-12-2012	**Location:**	Molinella (BO)	1F
Speciality:	Danze latine	**Type of test:**	5 danze di 1'30" con 30" di recupero	

Name:		**Sex (M=1; F=2):**	2	
Date of birth:	1994	**Height:**	1,55	**BMI:**
Age:	18	**Weight:**	51	21,23

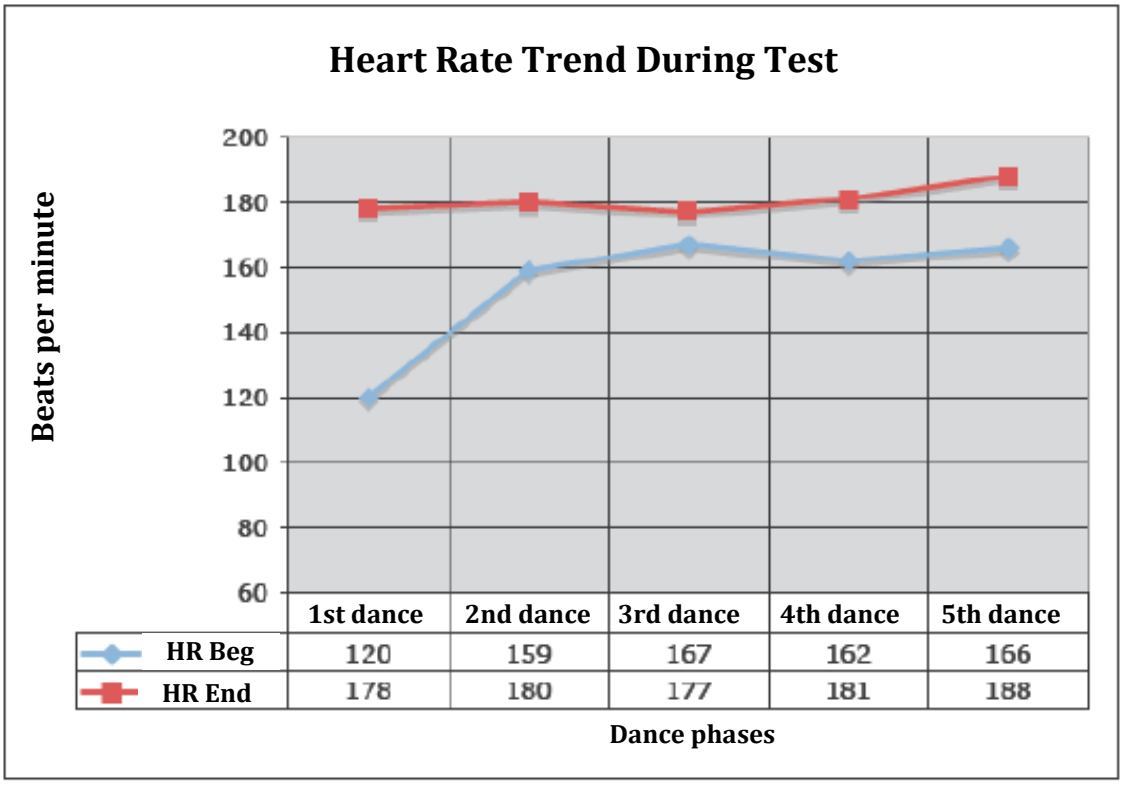
	HR beg:	HR end:	Difference:	%
1st dance:	120	178	58	32,58
2nd dance:	159	180	21	11,67
3rd dance:	167	177	10	5,65
4th dance:	162	181	19	10,50
5th dance:	166	188	22	11,70

HR during recovery phase

End of performance	30"	1'	1'30"	2'	2'30"	3'
188	167	153	133	121	120	111

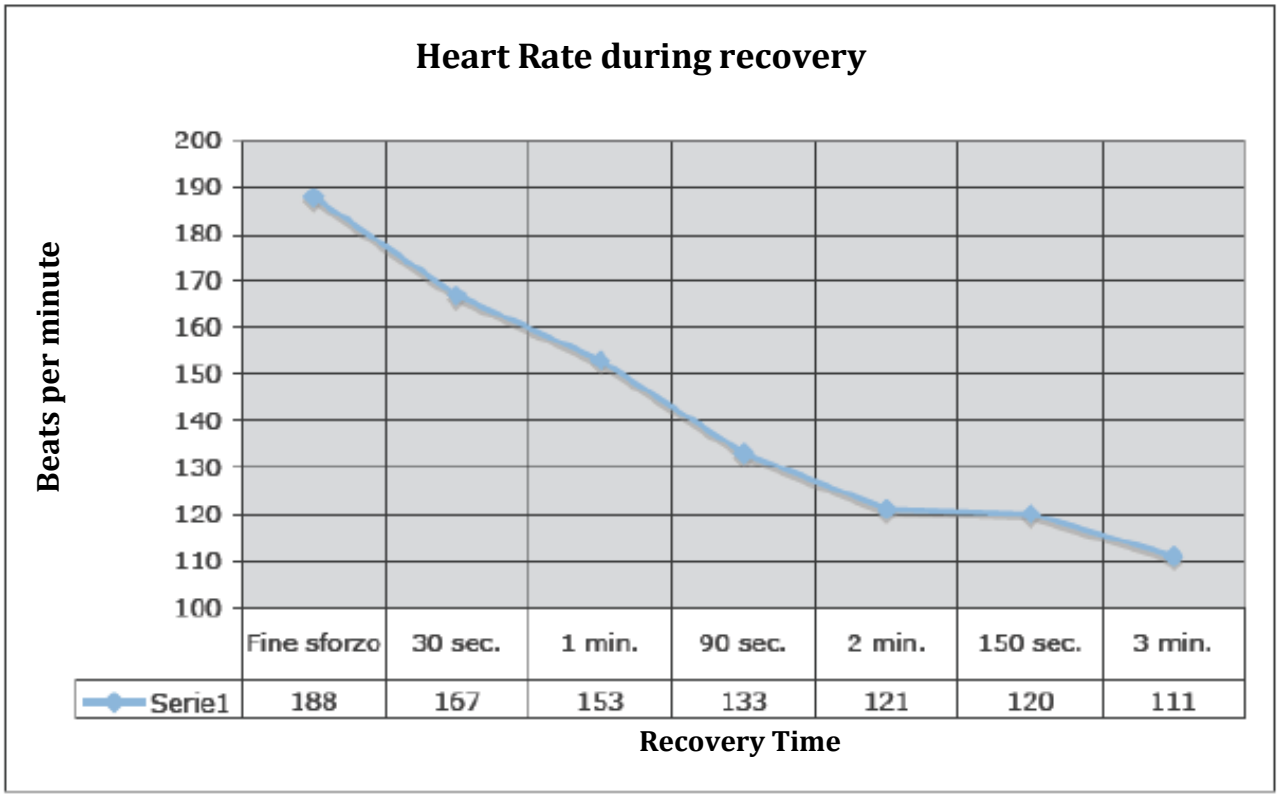
% Decrease in recovery fractions:	
End of test - 30'	11,17
30" - 1'	8,38
1' - 1'30"	13,07
1'30" - 2'	9,02
2' - 2'30"	0,83
2'30" - 3'	7,50
End of test - 3'	40,96

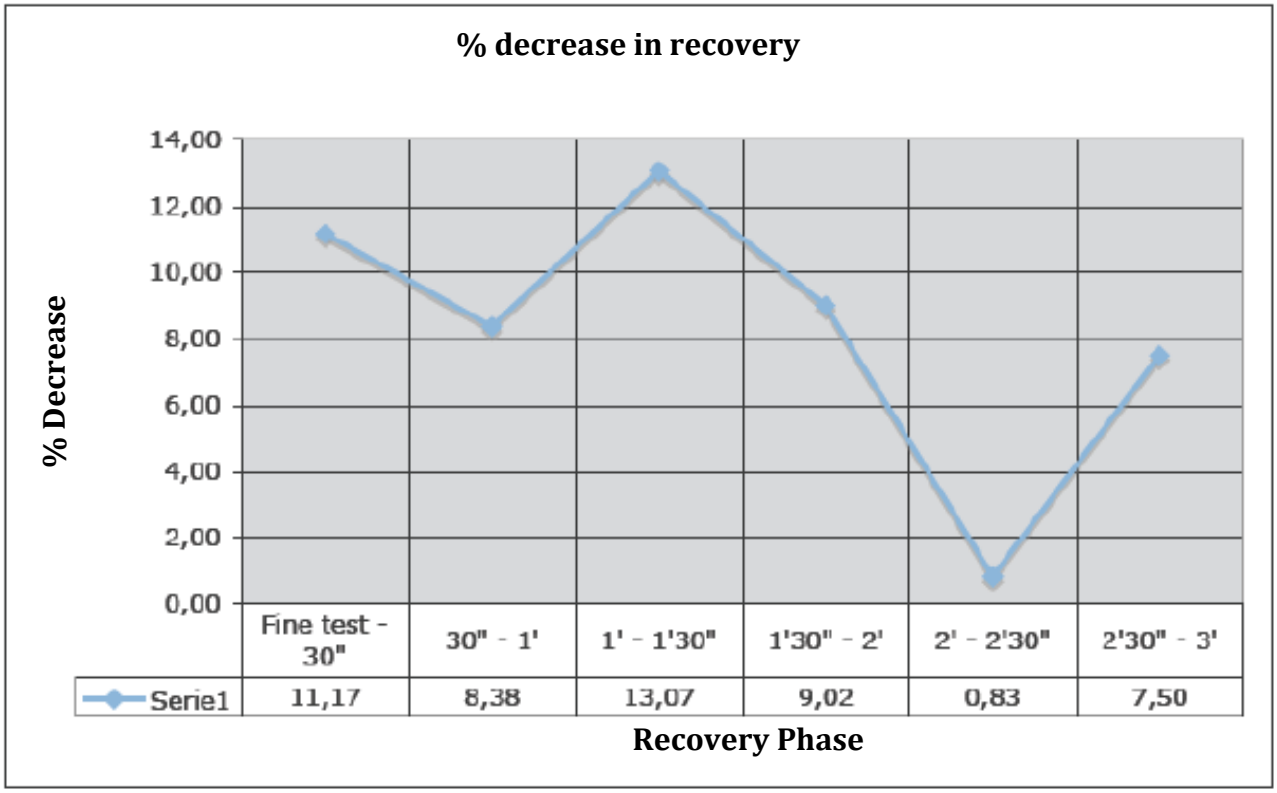
Resting HR:	
Max theoretical HR:	208
Peak Test HR:	188
HR beginning test:	120
HR end of test:	188
Diff. HR Beg.-End test:	68
% diff Beg.-End test:	36,17
HR end of recovery:	111
Diff. HR Beg.-End recovery:	9
Diff. % Beg.-End recovery:	7,50



Test date: 8-10-2012 1F

Name:





Test date:	19-12-2012	**Location:**	Molinella (BO) 1F
Speciality:	Danze standard	**Type of test:**	5 danze di 1'30" con 30" di recupero
Name:		**Sex (M=1; F=2):**	2
Date of birth:	1977	**Height:**	1,48 **BMI:**
Age:	35	**Weight:**	48 21,91

	Puls. inizio	Puls. Fine	Differenza	Diff. %
1st dance:	102	170	68	40,00
2nd dance:	132	184	52	28,26
3rd dance:	156	185	29	15,68
4th dance:	162	179	17	9,50
5th dance:	150	192	42	21,88

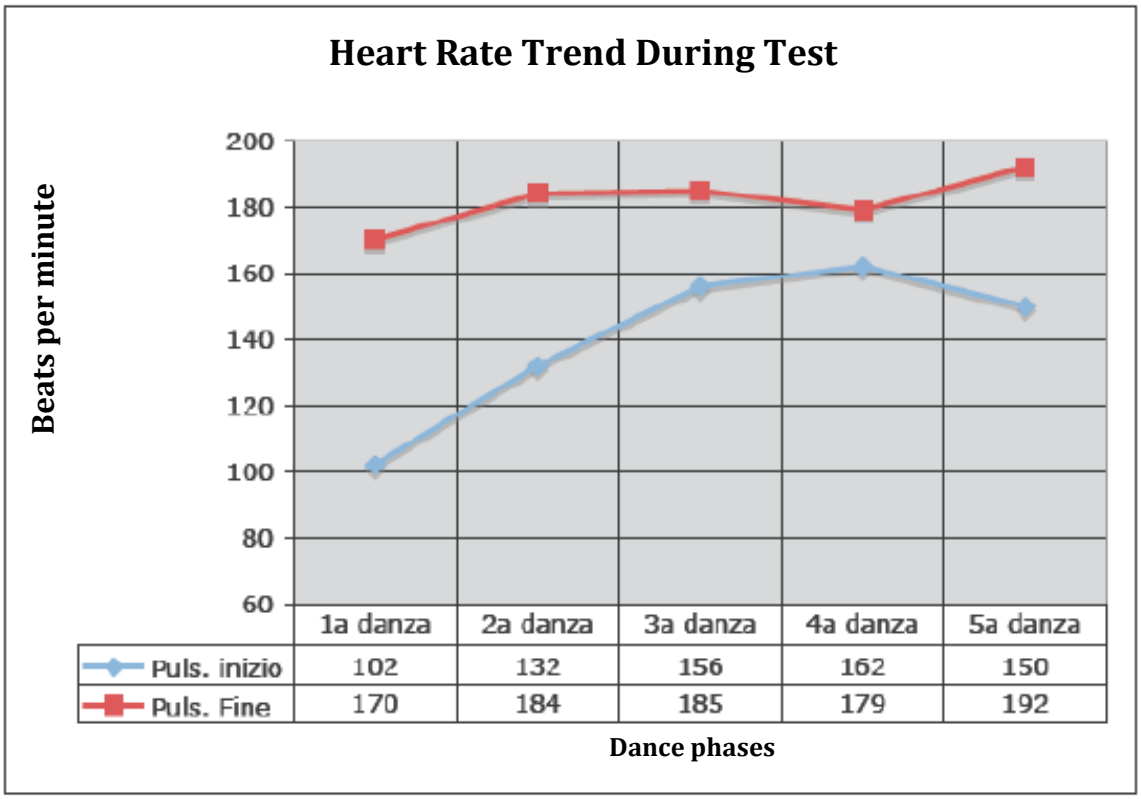
HR during recovery phase

End of performance	30"	1'	1'30"	2'	2'30"	3'
192	164	143	125	114	108	107

% Decrease in recovery fractions:

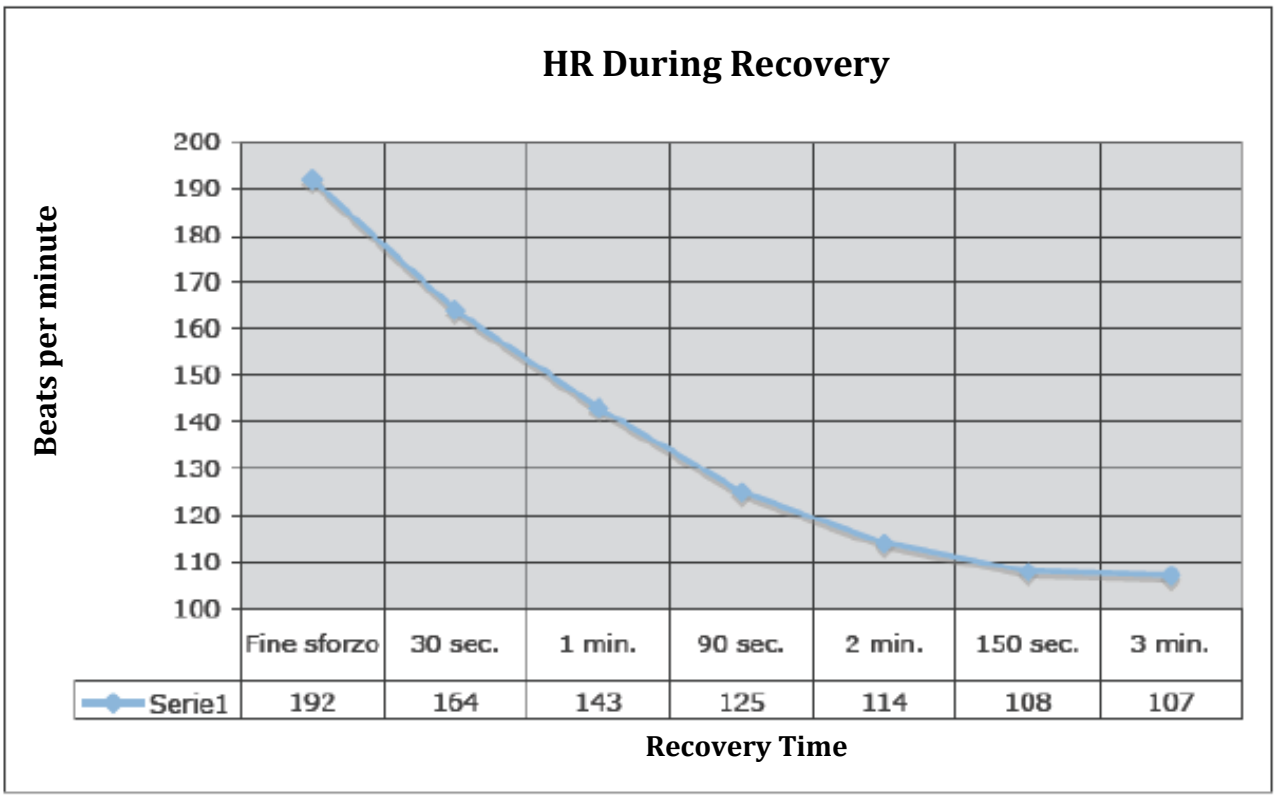
End of test - 30'	14,58
30" - 1'	12,80
1' - 1'30"	12,59
1'30" - 2'	8,80
2' - 2'30"	5,26
2'30" - 3'	0,93
End of test - 3'	44,27

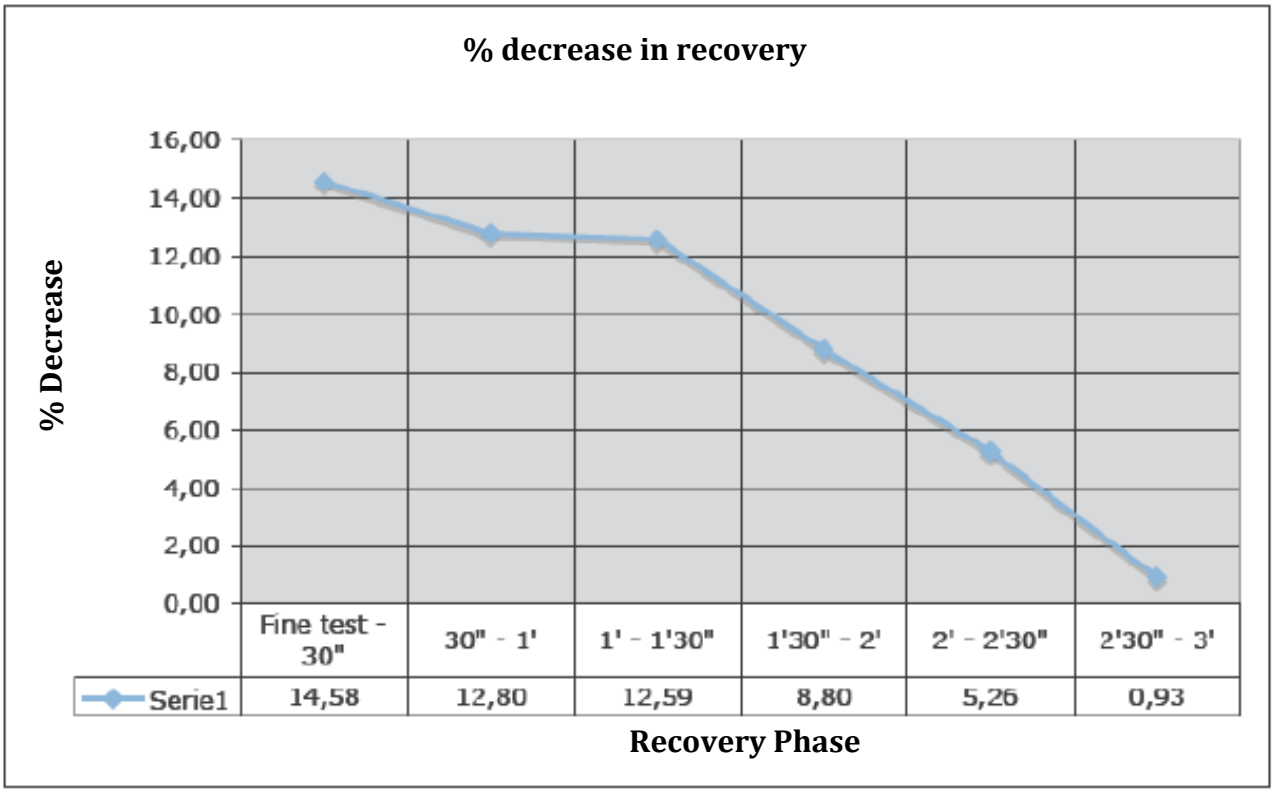
Resting HR:	
Max theoretical HR:	191
Peak Test HR:	192
HR beginning test:	102
HR end of test:	192
Diff. HR Beg.-End test:	90
% diff Beg.-End test:	46,88
HR end of recovery:	107
Diff. HR Beg.-End recovery:	-5
Diff. % Beg.-End recovery:	-4,90



Test date: 8-10-2012 1F

Name:





CHAPTER THREE

Team Diablo Modus Operandi

After years of experience, Team Diablo has reached a systematic way of developing dancers both physically and technically. The various experts in both areas of technical education and of physical development were involved in numerous encounters over years of work with the intent of creating programmes in which objectives could be reached in both spheres, working in full independence of whilst not in contrast with one another and creating working protocols, exercises and activities without creating conditions of difficulty "for the organism", for example working under high stress both physically and technically contemporarily.

Physical training has been enriched with tests, differentiated for youth and for adults, physical training programmes have been adapted to the necessities and possibilities of the athletes creating formative activities for youth and specific activity for adults through the development of personalised training plans.

The technical sphere has been enriched with data thanks to the insights obtained through video analysis and with the specific technical learning courses implemented.

The area of formation/education has evolved thanks to specific insights into studies connected to the areas of psycho-pedagogy of teaching and the scientific-technical area, through themes connected to the areas of:

- Methodology of sports teaching
- Methodology of sports training

Thanks to this knowledge, goal-specific training plans and examples of yearly training schedules were produced specifying detailed activity for the development and improvement of the physiological characteristics required for dancing and, consequently, the overall level of the couple.

The following are the types of training used in what we could call the "Team Diablo Method", categorised according to subject.

Performance and Competition Simulation

The Team Diablo Method used an innovative programme to develop the coordinative and conditional capacities in similar conditions to those found in competition.
Team Diablo's dancesport athletes, as in traditional classical ballet classes, perform codified exercises; these are held once a week in a specific, guided training sessions called "Performance" practice.
The exercises vary from exaggerations of the technique and technical gestures, which subject dancers to similar or superior effort levels than those found in competition, to competition simulation exercises where the competition is either recreated in the studio or extremised, both extensively and intensively.
In this way the exercises respond to the needs of a "situation sport", where unexpected or sudden changes can occur in the competition environment (temperature, floor conditions, floor size, number of competitors on the floor, etc.).
All of this is done while monitoring the psychological and physical conditions of the participants through instruments such as wireless heart rate monitors.
In addition the technique, studied previously in various general, specific and applied lessons, is monitored through the use of video analysis, and often extremised, in particular in specific exercises

to obtain and stimulate maximal concentration from the athletes, and a constant data-relay aimed at improving the ideal technical model.
The competition simulation programme, in order to have a positive effect on the athletes, is repeated twice a week and open to all Team Diablo members on Monday and Wednesday evenings, and concludes the daily programme of the Academy and Institute.
In this environment which involves a greater number of couples and the presence of teachers and judges as audience members, allows, especially from an emotional point of view, the reproduction of a typical competition situation and, as a side effect, allows couples new to dancesport to experiment with the performance method for the first time.
Thanks to this specific type of guided practice in competition conditions, Team Diablo's technical experts and talent scouts can easily identify athletes possessing the characteristics necessary to adapt to the training method required.
Furthermore, for athletes already involved in the performance programme, these weekly competition simulations can be used to test technical improvement and physical condition through direct comparison with other athletes.

Artistic Preparation

Dancesport is considered a "technical-combination" sport where the "artistic component" is the predominant aspect in competition evaluation; many of the most important teachers in the dancesport environment have always tried to put these elements into balance: technique, music and artistic interpretation. The perfect symbiosis between these elements produces a final iteration of extremely expressive performance which affects and involves whoever is watching.
Given that artistic interpretation is the quality responsible for the transmission of emotions, dancesport and dancers use this as a fundamental vehicle for these feelings, and it is for this reason that great teachers, who were in their turn great artists, do not waste this unique opportunity to develop the aesthetic expression of the interior human soul.
Peter Maxwell, the mentor of this group (and not only at an artistic level), represents the very best of this type of teacher, with an extensive artistic preparation thanks to his profound knowledge of non-verbal body language and his ability to translate movements and expressions into artistic motion in dancesport.
Thanks to his particular abilities, he is able to help dancers to express, respecting the codified technique, their technical capacity, rendering them capable of inspiring whoever is watching their performance, and revealing all the charm and emotion that music, choreography and body language can express in the entire choreography, a simple step, or even in a small technical element together with the dancers' artistic expression.

Team Diablo, in carrying out its technical-practical preparation, conditioning, coordination, and organisational programmes never forgets, but rather enhances, thanks to the help of these great teachers and collective activity such as Psycho-Cybernetics and theatre, the fundamental artistic and expressive component of dancesport, always trying to correlate all of this with the music, to create the best conditions for reaching the highest level of performance.

The "Dancesport Academy" Project

The intuition: An "educated" Dancer/Teacher means a "successful" Dancer/Teacher

The world of dancing has always seen information transmitted directly from teacher to student, and over the years this has produced dancers with an excellent coordinative quality, but the tendency over the years was only to create well-coordinated dancers, without a predisposition to deepening their understanding of subjects which could have enriched their educational experience.
More simply, this teacher-student relationship, instead of developing knowledge and culture tended to belittle this important objective, and this was easily deduced from the fact that most teachers preferred to hide errors rather than correct them, wherever these errors occurred: in coordination, in conditioning, psychology, organisation, economy, etc.
For this reason many dancers found it difficult to evolve, apart from at a choreographic level, from their initial propaedeutic condition, typical of a beginner or social dancer; improvement was slow and the information often contradictory, especially if more teachers were involved in the learning process.
Change was to be achieved through an educative project that, involving dancers and teachers, reorganised the information connecting new knowledge which correlated study material brought to the dancesport world, evolving that world and bringing it up to the level of all other sports which already availed themselves of the use of advanced scientific knowledge.
Team Diablo, which has always been interested in research and development, decided to empower its structure with something unique in this environment, organising a training course based on weekly meetings, open to all of its members without distinction, and open to both teachers and dancers wanting to take part.
And so the first Dancesport Academy in the world came to be: an incredibly innovative and at times revolutionary project for the dancesport world, where dancers, who had only worked on steps until then, would dedicate six hours a week from that moment on to the theoretical understanding of both directly and indirectly related subjects.

Constructing a project: principal and related subjects

The academic project needed a series of study topics directly relating to dancing and performance, as well as other related topics which could indirectly influence the dancers. Practically, a dance teacher's education required preparation in terms of technical knowledge and in terms of physical preparation and methodology of teaching.
Lessons were and are held in what could be defined as classic or principal subjects:

- Coaching
- Technique
- Physical Preparation
- Competition Simulation

Team Diablo had already studied these subjects carefully in the years prior to the beginning of the project and had already gained a vast amount of knowledge in relation to that found in external realities.
The related subjects taken into consideration by Team Diablo (with the express intent of developing those classic topics stated previously), were a novelty to the dancesport world and were those that allowed the group to reach the elusive goal of an "educated dancer/teacher". The related subjects chosen for this level of preparation were:

- Anatomy
- Biomechanics
- International Dance Expert lectures
- English
- Italian

- Training Methodology
- Teaching Methodology
- Motivation
- Nutrition
- Pedagogy
- Physical Preparation
- Sport Psychology
- National and International Rules
- Acting
- Video Analysis

DSA-DSI Genesis

The academic project came into being and developed through constant research into methods of teaching, but also management and entrepreneurship with the intent of bringing Team Diablo Dancesport to the highest possible level, leaving nothing to chance in any area.
The founding goals in which the academy project is still deeply rooted today were to develop and organise an increasingly specific central structure and to inform and educate the managers of satellite structures. In its embryonic phase, the academy consisted of no more than a simple guided practice session, and has evolved to include various activities in the various halls in Molinella.

The birth and growth of a project

The first major structuring of the project came in 2005 with a real academic guideline and a final exam. Since then, the ceremonial prizegiving for the Academy has been an important moment institutionally which takes place at the end of every academic season during the International Training Camp in Caorle.
At the beginning there were not many participants, but those few, using the information in this project, managed to obtain success relatively quickly in their careers; in fact nearly all of the international dancesport stars, World Champions and World Championship Finalists were part of this initial group. And the group not only produced champions, but also teachers of great success, who, together with the stars of dancesport, are still in the Academy today, in a sub-section known as the Master DSA group.
Over the course of the following years the Academy became the ambition of many athletes and teachers, but the growing knowledge gap between the veteran members of the Dancesport Academy (DSA) and those joining for the first time rendered the addition of a second course necessary. The DanceSport Institute (DSI) was therefore founded to educate the new participants on a weekly basis. The didactic plan was once again based on directly and indirectly related topics, using the same educative formula albeit with a lower level of specialisation, but including a final exam; the prizegiving ceremony at the end of the scholastic year was included in the International Training Camp in Caorle.
Many of Team Diablo's affiliated clubs, especially those run by Academy members, were passionate about the project and started organising small guided practice sessions, imparting similar information to that explained in the DSI and DSA, but in a simpler, more essential format. The name DanceSport School (DSS) was awarded in recognition of the passion of these members and to reward their initiative, which never conflicted with the academic programme.
Today the central headquarters of the Team Diablo in Molinella has the two specialist courses (DSA and DSI), which are replicated every year; the numbers and quality of the participants increase constantly, following Team Diablo's motto "Quality and Quantity".

DSA-DSI Organisation: Criteria for Promotion

The academic project is organised as a "closed" course, in that access to the Academy is reserved exclusively for a select group of participants, whereas the DanceSport Institute is an "open" course, with no limiting criteria for participation for any Team Diablo member. It is not necessary to be a competitor.
In both cases, being a current member of Team Diablo is a fundamental prerequisite, and to remain part of the course and achieve the end of year diploma, several rules must be adhered to.
The goal is to give every student the chance to pass the academic year in that the participants' level of interest can be ascertained through their performance and, furthermore, participants with capacity and ability can be identified and established as members with favourable characteristics to be reliably considered as trainers and competitors within the Team Diablo brand.
The prizegiving is an important target because, apart from the fundamental value it intrinsically affords the student, it determines who is promoted to Academy; one of the earnest ambitions of any DSI participant. Access to the DanceSport Academy can only be achieved after three full years of participation (achieving the end of year diploma), reaching a certain score at the end of the third year. Once achieved, this honour means sitting among the other members of the DSA and being part of the leadership core of Team Diablo, where, apart from the continuing education of its participants, projects are produced and discussed for the development of DanceSport at every level, making it also a sort of course for managers.
Within the DSA, members can aspire to further honours, and through the sum of scores over years of participation, DSA Master status can be achieved.
All of this is not to be viewed as a simple points system, in that the academic focus remains on what is done to reach the target rather than just reaching the target itself. There is no inherent value in the points when achieved superficially and without full intent. In this way the system is set up to incentivise the study and application of the knowledge transferred, in the hope that the maximum yield can be produced in every sector in which Team Diablo sets its sights, from Social Dance at a propaedeutic level to the highest level of competition.
To reach the prescribed goals, participation in DSA and DSI needs to reflect certain criteria which are described below:

- *Attendance*; impeccable self-organisation is important as simply enrolling in the course is not enough to be really involved in the project so being present is a fundamental requirement; to this end, attendance points are assigned to each student every day they attend the course and are summed at the end of year as part of the final score.
- *Event support*; every Team Diablo event has its beginnings in the Academy and so participation in these events is considered fundamental for a DSI and DSA member; a full calendar of events for every level is discussed and structured annually within the academy and points towards the final score can be earned for attending and actively participating in these events (the points system is described fully in the rules). In this context teachers can also earn points through the participation of their students, and the results achieved by their students are attributed to them when the event in question is a competition.
- *Exams*; as for every education course, tests and exams are an important element which work to keep students stimulated all season long, and precisely for this reason two dancesport technique exams are held (one Standard and one Latin), based on the study of the WDSF technique books; both exams include a practical section (obligatory for competitors) and a theory section. The goal is that of getting the students used to being under constant examination and, every so often, short written tests are also assigned for other topics (to which bonus points are applied). The sum of the results of the two technique exams go towards the final end of year score.
- *Promotion*; encouraging students to participate in the DSA-DSI project is another fundamental characteristic for every participant, so special bonus points are awarded to those who involve their students and others in the Academy project.

The results achieved over these four points are the proof that participants are deriving the most from the project and obtaining the most benefit from the Academy and Institute courses.

The technique: A successful academic project in action

The technique is, without doubt, one of the most studied subjects within the DSA-DSI programme, but this was not always the case; many years ago the written technique and that performed in competition developed together, but over time something changed: the dancing itself underwent technical evolution, but the technique manuals remained unvaried. This situation meant that the old manuals were held in contempt by many, considered useless and obsolete in that the modernisation of dancing had surpassed the written technique.
Not using the technique books meant that, even though competition dancing continued to develop, there was a lack of clear guidelines for dancers, and for Team Diablo, aware of this situation, the technique, even though apparently obsolete, could not be ignored, and so the decision was made to study the historic technique manuals within the academic course.
This choice meant that competition dancers were once again involved in the comprehension of the fundamental principles of dancing and, thanks to this spirit and the studies made previously by Davide and Olga Cacciari, the technique was catalogued in levels.
The division of the technique into levels was the great innovation; in effect, the technique could be comprehensibly organised to maintain the inclusion of the historic manuals:

1. Fundamental/Historic Level
2. Application of the fundamentals in a dynamic form
3. Choreographic and Interpretative application of the technique

From this important conclusion it became clear that the levels of technique exist in symbiosis, and that third level cannot be used if the first two are not fully understood.
The technique must be studied in its theoretical form (especially the first level), with the help of trained experts, and its practical application should always be watched over by an expert eye. And so various preparation methods were developed: from the practical-theoretical exams mentioned above, to the biomechanical analysis of the technical actions, to the use of related techniques such as physical preparation, psychology and nutrition to render technique practice and training more efficient.
For years now within Team Diablo an enormous amount of constant development has restored the connection between the written technique (especially thanks to the WDSF books) and the dance performance, with well defined performance models which have allowed the team to excel in every important competition in the dancesport world, earning national, continental and world titles .

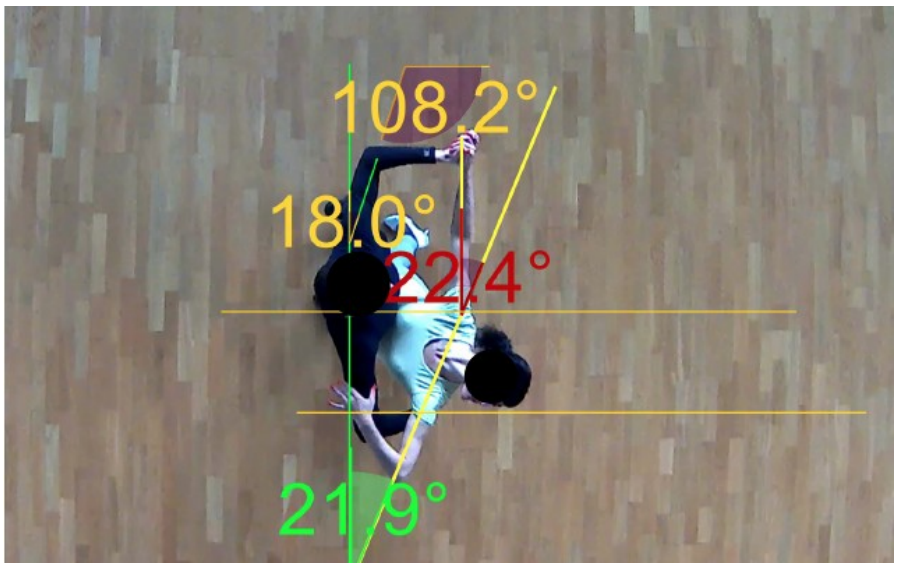
Quantitative Investigation using Video Analysis

Video analysis as a technique has progressively developed thanks to technological advancement in the areas of image acquisition and treatment.
In dancesport this has meant progress from a simple search for errors by coach and couple and attempts at amendments principally through discussion, using images which were difficult to compare over time and were nearly impossible to view contemporaneously, to a video-system for scientific performance analysis. The Dartfish system was therefore chosen which, after careful study of its function and application, using contemporary video registrations over all three axes together with the possibility to compare images taken from different angles simultaneously, was able to highlight image comparison with the same orthogonal orientation. Furthermore, use of this technology permitted a deeper analysis of technical actions allowing targeted suggestions for corrections which could then be monitored over time, and the possibility to verify the actual improvement of technical concepts explained by teachers in lessons.

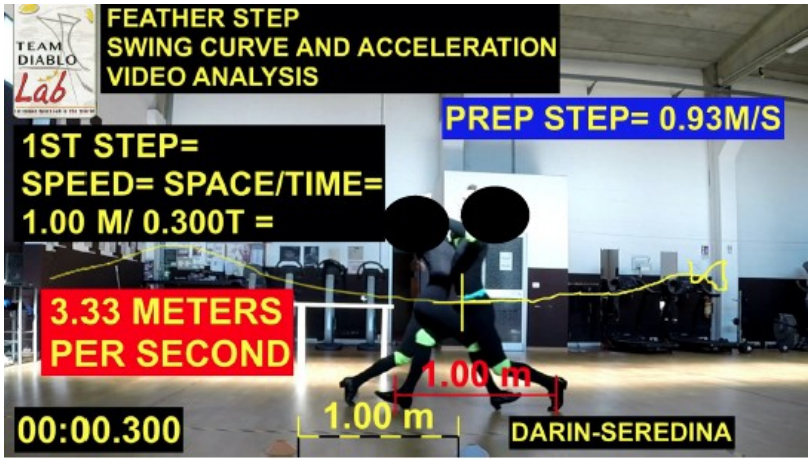
The question that springs to mind is: if video analysis is a technological instrument which permits the analysis of the same movement or gesture from different angles at differing speeds in order to highlight a detail which, more often than not, cannot be seen with a naked-eye analysis, what are the real advantages and how does it differ from the normal viewing of a moving image taken with a normal camera or smartphone?
There are many advantages and they can be summed up as follows:

- Analysis of the gesture without the athlete's necessary collaboration
- Static and dynamic functional evaluations of posturing
- Detailed analysis in technical improvement, the posture of the athlete, attitude, etc.
- A unique contribution to the execution and correction processes, especially useful in training younger, evolving athletes
- Useful for ideo-motorial training of motor schemes
- Source of motivation for the athlete to improve based on self-comparison
- Useful in rehabilitation, especially comparing data from before and after an injury.

In the following figure, an example of "UPVIEW SETUP" of a standard couple is shown.



In the following figure, an example of quantitative video analysis is displayed.



Video analysis in dancesport is of fundamental importance to the improvement of couples and single athletes during all phases of their career; possessing a database of each couple and athlete allows comparison over time and tracking of the evolution of a movement to therefore verify its improvement.
The importance of this instrument to analysis is becoming a fundamental component in the "Team Diablo Method" to the point that, ten years ago, a laboratory was set up with one room image reception and another for data analysis at the main headquarters of Team Diablo in Molinella, with appropriate equipment and spaces. In this way video analysis could be used frequently and by all members satisfying the needs of teachers and their couples.
Through years of activity, the Video Lab has constructed a database which meets the needs of dancesport athletes from all categories and classes, supplying objective data which can be compared over specific time periods and associated with particular corrective measures, enabling athletes and teachers to ascertain any eventual changes in technical capacity.

In video analysis, all extrapolated objective parameters are catalogued by category and class, together with the height and weight of each athlete, two fundamental components which must be considered when trying to make an "effortless" and therefore optimal movement.
The Video Analysis and Statistics procedures are archived in three major groups and span various technical aspects (e.g. posture, feet, legs, speed, propulsion, rapidity, sharpness).
They are:

- Beginner
- Intermediate
- Advanced

An "Entry Level Period" for the athletes and couples of all classes is necessary, if not obligatory; that is a period of normalisation where the goal is to know the real biomechanical and technical level of the athlete and to create the fundamental basics, growing confident with the data and system.
After years of research and of observation, the Coordination Coefficient (CDC – Coefficiente di Coordinazione) has been the most interesting data found; this is objective data of fundamental importance which can allow the athletes to monitor the purity of their movements where movement of body weight from one foot to the other is made fully or partially.
This coefficient can be measured over three parameters:

- Distance travelled
- Speed of Centre
- Speed of Moving Leg

In this area, the highly precise and professional instrumentation used in the Video Lab holds a unique importance, registering highly precise data which can be remeasured in the future.
Programming this type of control constantly (CDC Check) is strongly suggested for all categories and classes in both disciplines.

Following a statistical analysis using the database, a series of comparative data was extrapolated exposing the difference between interventions using and not using video analysis; these results are presented below.

From statistics based on a group of 50 couples, the technical improvement of Youth A Class couples (in Standard and Latin American) monitored over a year can be expressed as:

- 10% without Video Analysis
- 75% with Video Analysis

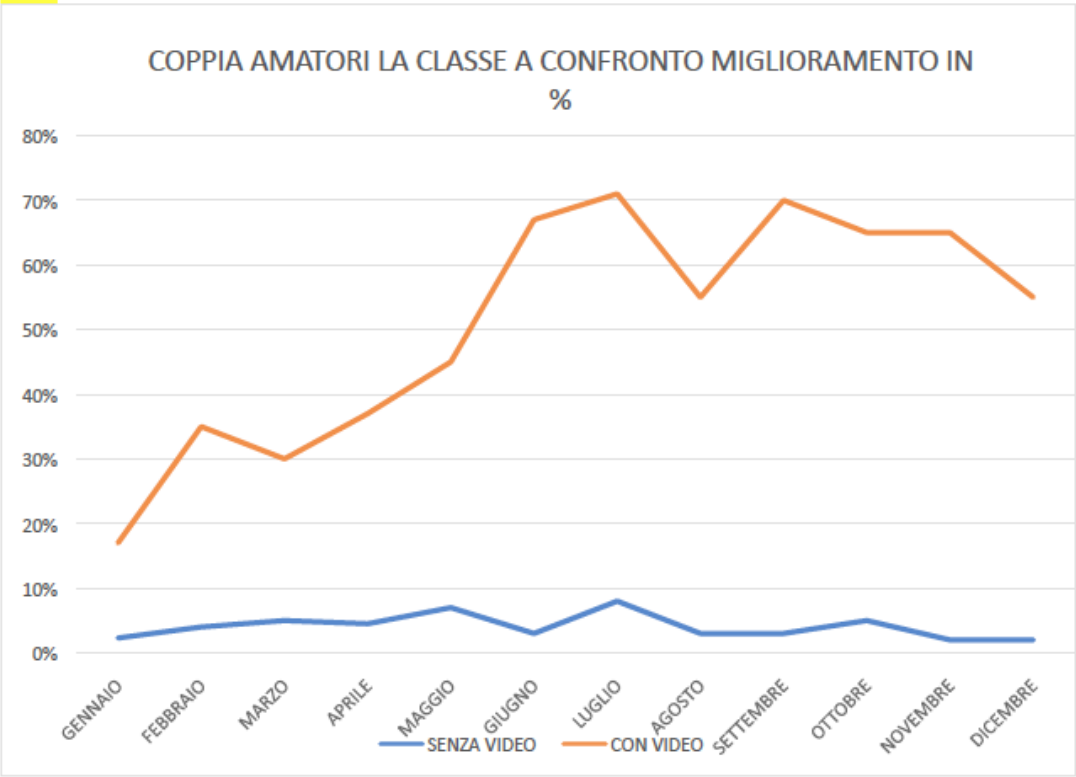
From statistics based on a group of 50 couples, the technical improvement of Amateur A Class couples (in Standard and Latin American) monitored over a year can be expressed as:

- 7% without Video Analysis
- 65% with Video Analysis

From statistics based on a group of 50 couples, the technical improvement of Senior A Class couples (in Standard and Latin American) monitored over a year can be expressed as:

- 4% without Video Analysis
- 70% with Video Analysis

In the following figure a comparison between the % improvement in A Class Amateur couples over a year; those not using Video Analysis are displayed over the blue line, while those using Video Analysis are shown in red.



The Team Diablo Academy Aula Magna

DSA Logo

Physical Preparation in Dancesport

In the past, physical preparation was considered to be of no importance whatsoever to dancesport. Only recently have traditional training programmes in dancesport been flanked with fitness programmes in that physical training connected with dancing had been somewhat rejected by the academic world, due mostly to a certain reluctance to embrace this innovation and a disinclination towards breaking with traditionally-held principles.

Even to an untrained eye, a superior intensity level of dancing can be witnessed in modern dancesport events in relation to the past, magnified by the increased daily physical commitments that the highly demanding competition environment requires. Scientific investigation into athletes' performances, specifically through VO2 and lactate measurement, have shown elevated energy levels requiring specific high-intensity training programmes and obvious adjustments to the organic-muscular system.

Today it is universally accepted that poor physical preparation does not provide dancers with adequate support for the elevated energetic and muscular requirements involved in modern dancesport. Training protocols involving only dance-related activity do not provide sufficient stimulus for a solid aerobic, anaerobic, and muscular base to satisfy the workload required by a dance performance. Dance preparation which does meet adequate energy consumption levels to satisfy the aesthetic and energetic requirements of the technique induces, consequently, a limited caloric input. This tends towards a low level of fat mass, which is important for the performance, but also a low level of lean mass, which limits the ability of the body to undergo intense, lengthy, and voluminous practice sessions, and increases the risk of injury (traumatology in dancesport is described at p.77). Thus, dancers could benefit from a solid aerobic base and a high anaerobic threshold to limit the negative effects of lactate accumulation in the blood such as deteriorating performance capacity in terms of organic capacity, coordination and balance.

The data shown previously should be enough to demonstrate that traditional protocols are no longer adequate to prepare an athlete for high-performance, modern dancesport.

A marginal comment must also be made about the use of force or strength. This has always been a factor held as unnecessary to reach high levels of performance in dancing, but acute observation cannot ignore the fact that dancers hold and maintain excellent posture during the performance, thanks to elevated levels of strength in the abdomen, as well as ample and rapid movements which can only be achieved through high levels of strength in the arms and legs.

At this point the question must be asked: can dancing alone increase strength levels?

It is obvious that traditional dancing lessons are not able to satisfy this requirement, and it is just as evident that the injuries sustained by dancers are intricately linked to shortcomings in physical form, which in certain aspects can be compared to sedentary subjects.

It has also been proven that the introduction of physical training sessions into dancers' weekly programmes has positive effects in terms of increased physical form as indicated by relative parameters and in dance performance, demonstrating that physical preparation for dancesport has absolutely no negative influence on the artistic and aesthetic requirements of the performance, but enhances the coordinative and dynamic aspects of it.

Research into the physical preparation programme of dancers in the past produced no conclusion; practically, physical preparation in dancing did not exist.

Only in rare cases were small amounts of training relative to articular mobility used. The only form of physical training was dancing itself, used at low intensity to improve coordination and technique (and so with lower energetic solicitation than normal) and sometimes (but less often) at slightly higher speeds, but usually for technical and not physiological reasons.

One of the characteristics of the “Team Diablo Method” was its focus on physical preparation once the importance of the fundamental relationship of the performance with bioenergetic mechanisms emerged.
The first step towards constructing a working protocol for physical preparation based on the characteristics of each individual athlete, was that of subjecting our athletes to a series of tests not just to measure their level of motor capacity, but to create a database for each athlete to control the variation of their training parameters over time, born of the fundamental idea that tests are an essential instrument with which to follow the development trends of motor capacity in relation to the stimuli applied in training, and therefore using them as a way of monitoring practice, considering also that better performances are not achieved through increasing a single parameter, but through a balance of all parameters.

The working protocols included, therefore, the exercises necessary for each athlete; the importance being placed on reaching the required goal without a predisposition towards any one type of exercise. The sessions during the training week vary in relation to the competition season, the necessities of the athlete and that of the coach; in some cases a training plan is provided for the athlete to take home and work on autonomously.

Stefan Green and Adriana Sigona

Motor Capacity Evaluation Tests in Dancesport

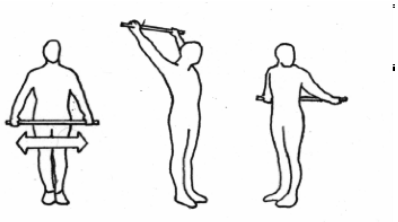
Tests are the means by which a concept can be measured. Any one concept can contain numerous indicative values which can also pertain to other concepts. A double battery of tests were chosen to use on two differing categories. These tests were meant to investigate the motor capacity of dancesport athletes and identify reference parameters for different categories of dancers.
The investigative activity and tests refer to two main categories, junior dancers (less than 15 years of age) and adult dancers (16 years and over).
A series of tests and evaluations were chosen for the junior age group, which tends to be characterised by a strong evolution in motor capacity due to constant physical growth, and another series of tests were chosen for the adult dancers who tend to be involved in a phase of qualitative development.

The tests chosen for the junior age group were:

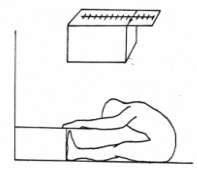
- Articular mobility tests
- Balance tests
- Rapidity tests
- Reaction tests
- Static Strength tests
- Dynamic Strength tests
- Agility tests

1. **Articular Mobility Tests**
   - 1.1. Scapularhumeral
     - 1.1.1. Arm Circumduction
   - 1.2. Spinal Column
     - 1.2.1. Sitting Forward Flexion Test
   - 1.3. Acetabulofemoral
     - 1.3.1. Hip abduction
   - 1.4. Hip
     - 1.4.1. Leg Hyperextension

Scapularhumeral

Arm Circumduction	Description	Measurement
	The subject, erect, holds a rod at its extremities and performs a circumduction of the arms, passing the rod over the head.	The value measured is the distance in centimetres between the hands. Analysis: Measurement of the hold / Measurement of arm opening.

Spinal Column

Foward Flexion Test	Description	Measurement
	The subject, sitting with legs straight and feet against the bench, flexes forward trying to reach forward as far as possible.	The value measured is the distance in centimetres from the edge of the bench to furthest points the hands reach.

Coxofemural

Hip Abduction	Description	Measurement
	The subject, erect, divaricates the legs as wide as possible with straight knees.	The values measured are from the pelvis to the floor and the distance between the feet. Analysis: Pelvis-Floor / Distance between feet.

Hips

Hyperextension	Description	Measurement
	The subject stands in front of the wall and leans head, thorax, arms and hips against it with the arms held up above the head. The feet are moved away from the wall to the point the heels come up.	The distance from the heel to the wall is measured in centimetres.

2. Balance Tests

2.1. Dynamic Balance

2.1.1. Walking with eyes closed along a 5m line, counting the steps off the line.

2.2. Static Balance

2.2.1. Standing on one foot for 30”

2.2.2. Standing on one foot with eyes closed for 30”

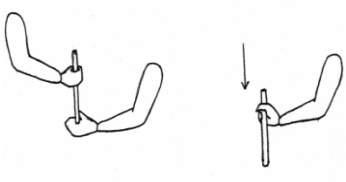
Static Balance

On one foot	Description	Measurement
	The subject stands on one foot with the free foot held against the other knee and hands on hips.	The test starts from the moment the free foot touches the opposite knee and stops when it leaves the knee, if the standing foot moves, or when the hands leave the hips.

3. Rapidity Test

Foot Tapping	Description	Measurement
	The subject, sitting on a seat, starts moving one foot touching it on one side and then the other side of a rod repeatedly.	The number of touches in 10 seconds is counted. The test is repeated with both feet and the % difference is calculated.

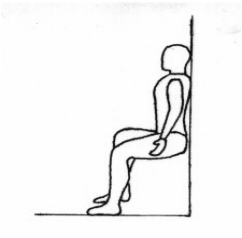
4. Reaction Test

Baton Drop	Description	Measurement
	The subject sits with an open hand and thumb extended upwards, and has to catch a baton dropped vertically by the teacher.	The best out of two attempts is taken, measuring the part of the baton underneath the bottom of the hand.

5. Static Strength Test

5.1. Seated position

5.2. Plank: lying facing downward on elbows and feet

Seated Position	Description	Measurement
	The subject positions themselves back against the wall with knees bent forming 90° angles at the hips, knees and ankles.	The time (in seconds) that the subject can remain in this position.

Plank on Elbows and Feet	Description	Measurement
	The subject lies face downward with only elbows and feet touching the floor.	The time (in seconds) that the subject can remain in this position.

6. Dynamic Strength Test

6.1. Explosive-Elastic Power of the lower limbs

6.1.1. Sargent Test Jump

6.2. Upper Body Strength

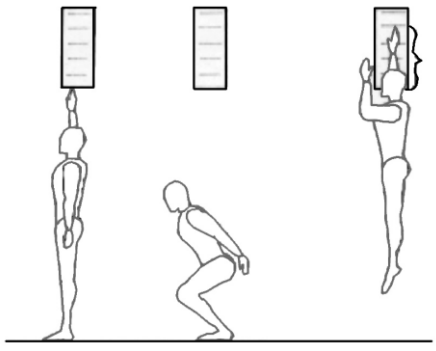
6.2.1. Press-ups

6.3. Abdomen

6.3.1. Abdominal test

6.3.1.1. Lying on the back with bent knees: flexion of the upper body towards the legs

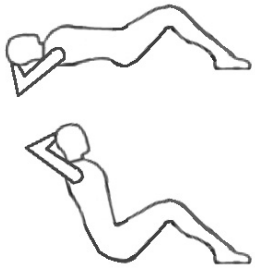
Explosive-Elastic Power of the lower limbs

Sargent Jump Test	Description	Measurement
	Side-on to the wall, the legs are bent and a jump is made trying to touch the highest point possible with the hand.	The difference between the height of the subject with arm raised and the height of the jump.

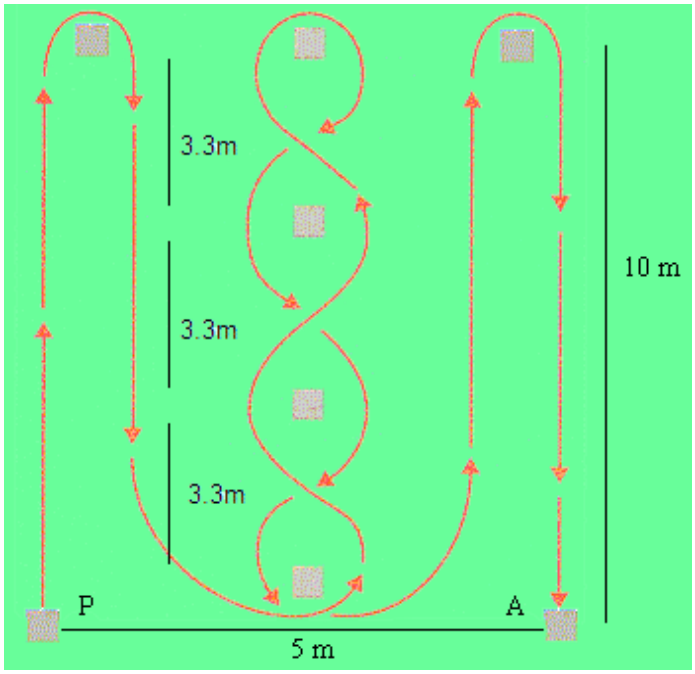
Upper body Strength

Press-ups	Description	Measurement
	Press-ups on the arms until 90° with the elbows.	The number of full press-ups made is counted.

Abdomen: Abdominal Test

From lying down: bust flexion	Description	Measurement
	With hands on the ears, knees bent and feet held.	The number of full sit-ups made in 30”

7. Agility Test

Circuit with Cones	Description	Measurement
	Running around a set circuit	The time taken to finish the circuit is measured

The tests chosen for the adult section are as follows:

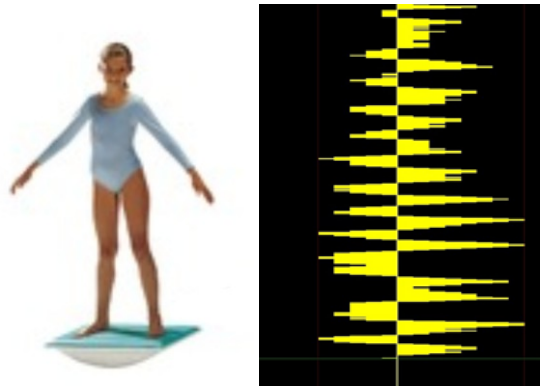
- Balance tests
- Dynamic strength tests
- Agility tests
- Physiological tests

1. Balance Tests

1.1. Balance on a computerised proprioceptive table

1.1.1. With eyes open

1.1.2. With eyes closed

Freedman Table	Description	Measurement
	Remain in balance on the table without touching the edges of the table to the ground.	Computerised data based on indexes of imbalance and re-balance.

2. **Dynamic Strength Test**

2.1. Explosive Strength in the lower limbs

2.1.1. Squat jump (SJ)

2.2. Explosive-Elastic Strength in the lower limbs

2.2.1. Counter movement jump (CMJ)

2.3. Explosive-Elastic Strength in the lower limbs with the use of the free arms

2.3.1. Counter movement jump with arms (CMJB)

2.4. Reactivity – Neuromuscular Stiffness

2.4.1. Drop jump (jumping after falling from various objects; DJ)

2.4.2. Vittori-Bosco (series of spring jumps with straight legs ; B/V)

2.5. Speed Resistance

2.5.1. Continuous CMJ (jumps made by bending the legs 90° with hands on hips)

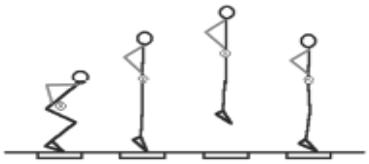
2.6. Calculation of the % of muscular elasticity from SJ and CMJ

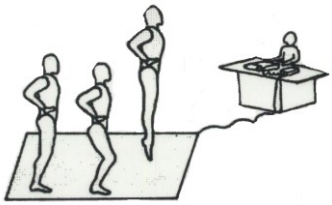
2.7. Calculation of the % of leg-arm coordination from CMJ and CMJB

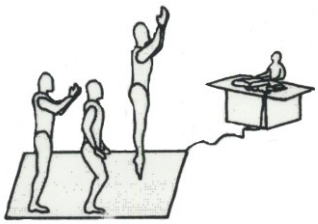
2.8. Calculation of the various Reactivity indices

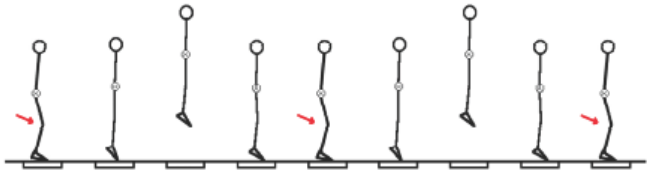
2.9. Calculation of the various strength, power and resistance indices of the lower limbs

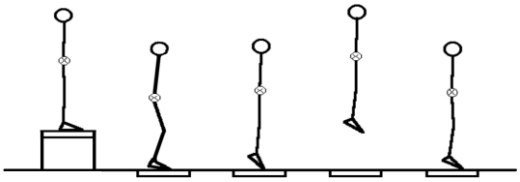
2.10. Calculation of the balance between the various muscle groups of the lower limbs

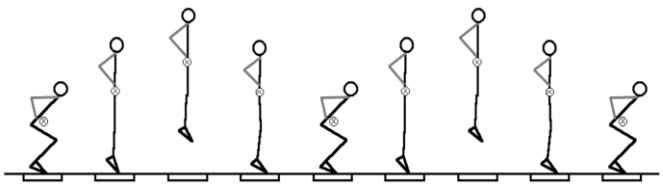
Squat Jump	Description	Measurement
	The subject stands on the platform with hands on hips, torso erect and legs bent 90°, and, from this static position, performs a vertical jump without moving the hands.	The height of barycentre reached during the jump is measured in cm by a computerised mechanism.

CMJ	Description	Data Measured
	The subject stands with hands on hips, torso erect and legs straight; then the legs are bent to 90° and, extending them quickly, a vertical jump is made without moving the hands.	The maximum height reached with the barycentre is measured in cm; this measurement is calculated using the computerised "Ergojump" mechanism. The difference in height of the CMJ in relation to the SJ is calculated and expressed as a percentage.

CMJB	Description	Data Measured
	The subject stands with erect torso and straight legs, then, bending the legs to 90° and, extending them quickly, a vertical jump is made together with a swing of the arms.	The maximum height reached with the barycentre is measured in cm; this measurement is calculated using the computerised "Ergojump" mechanism. The difference in height of the CMJB and the CMJ is calculated and expressed as a percentage.

Reactivity	Description	Measurement
	The subject remains on the platform for "*x*" time, bending the legs as little as possibile; the arms are free.	The flight time, the contact time, and the power generated is measured through computerised instrumentation.

DJ	Description	Measurement
	The subject stands on a raised object and drops to the floor, and jumps vertically as soon as they reach the floor. The arms are free.	The flight time, the contact time, and the power generated is measured through computerised instrumentation.

Continuous CMJ	Description	Measurement
	The subject jumps on the platform for "*x*" time, bending the knees 90° at each jump; hands are held on hips.	The flight time, the contact time, and the power generated is measured through computerised instrumentation.

3. **Agility Test**
   3.1. Circuit around cones (the same as the junior test)

4. **Physiological Tests**
   4.1. **Test 1: 5 dances lasting 1'30" with 30' recovery between dances**
      4.1.1. Heart rate measurement during each dance
      4.1.2. Heart rate measurement at the end of each dance and every 30" for 3' afterwards
      4.1.3. VO2 max test during each dance
      4.1.4. Lactate test at the end of every single dance

   4.2. **Test 2: 5 dances lasting 1'30" with 30" recovery between dances**
      4.2.1. Heart rate measurement over all five dances
      4.2.2. Heart rate measurement at the end of the 5th dance and every 30" for 3' afterwards
      4.2.3. VO2 max test during a dance
      4.2.4. Lactate test at the end of every single dance

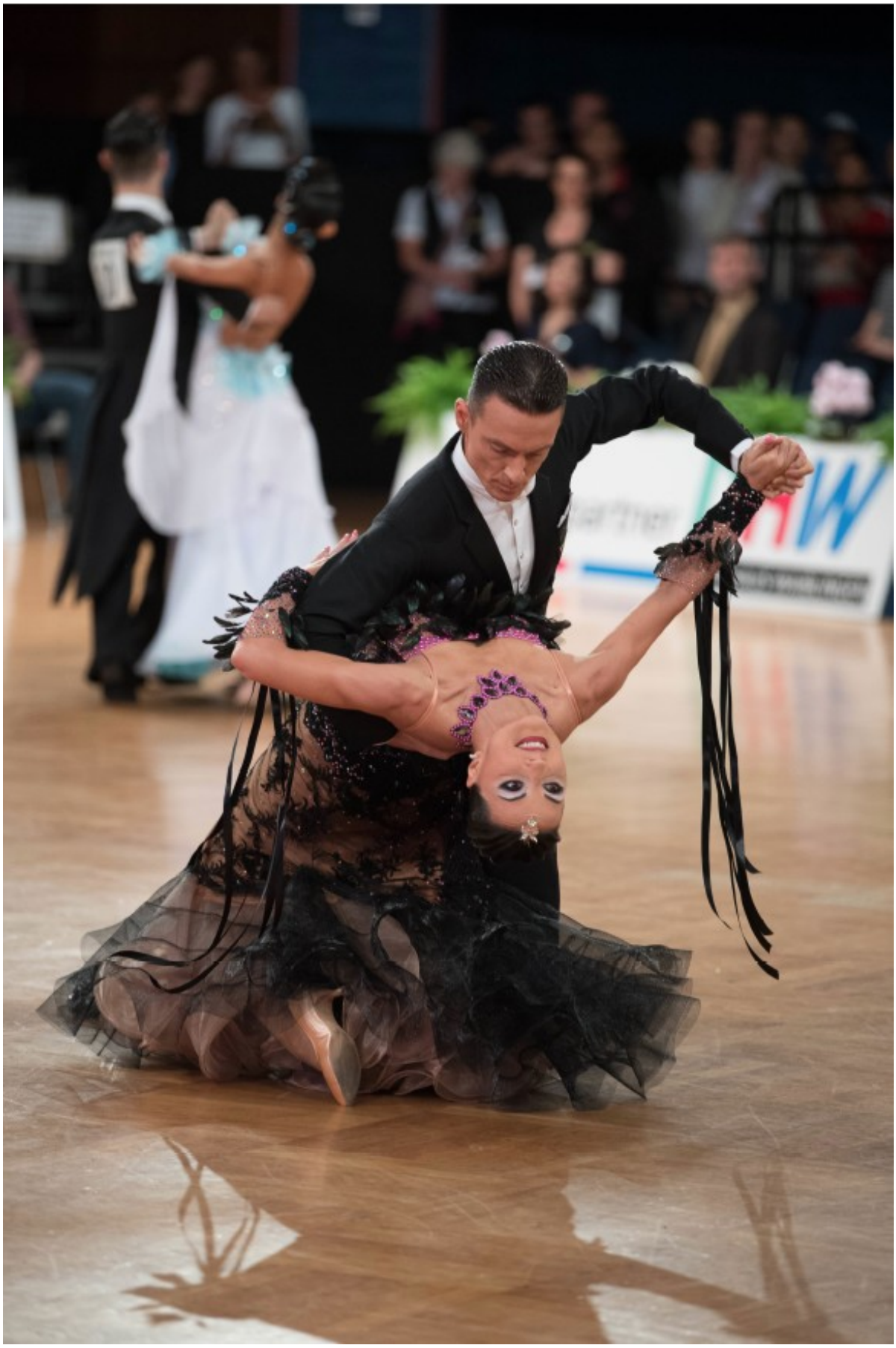
   4.3. **Test 3: Léger Test**
      4.3.1. Heart rate measurement during the Léger Test
      4.3.2. Heart rate measurement at the end of the Léger Test and every 30" for 3'
      4.3.3. VO2max measurement during the Léger Test
      4.3.4. Lactate measurement at the end of the Léger Test
      4.3.5. Calculation of the Maximum Aerobic Speed

   4.4. **Test 4: Incremental test on a treadmill to determine thresholds**
      4.4.1. Heart rate measurement during the test
      4.4.2. Heart rate measurement at the end of the test and every 30" for 3'
      4.4.3. VO2max measurement during the incremental test
      4.4.4. Lactate measurement at the end of the test
      4.4.5. Calculation of the anaerobic threshold
      4.4.6. Calculation of the aerobic threshold
      4.4.7. Calculation of the Maximum Aerobic Speed

In conclusion, indications about the basic motor capacity levels for dancesport can be obtained from the tests made on juniors, and these can be propaedeutic for the development of specific abilities for dancesport.
The adult tests can reveal information about the performance level of each athlete and indications for more specific training programmes with precise parameters regarding equipment and measures can be derived, giving rise to ideal practice sessions to develop higher level physical conditions.

Research and Development Centre Logo

Benedetto Ferruggia and Claudia Köhler



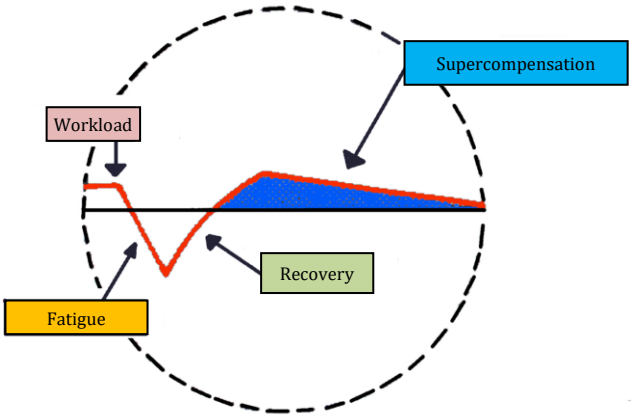
Practice Planning and Periodization

Training planning is based on scientific assumptions which in turn are based on the General Adaptation Syndrome, a concept invented by Hans Slye in 1936 (mediated by physics), when it was introduced it to indicate a "non-specific response of the organism to a negative stimulus".
The relationship between workload and recovery is a fundamental aspect in the theory of training with regards to improvement, in that training stimuli produce positive results only if:

- Tolerable alterations are induced (the stimulus is not excessive)
- An adequate recovery period is allowed (time to restore the organism to favour the supercompensation phenomenon)

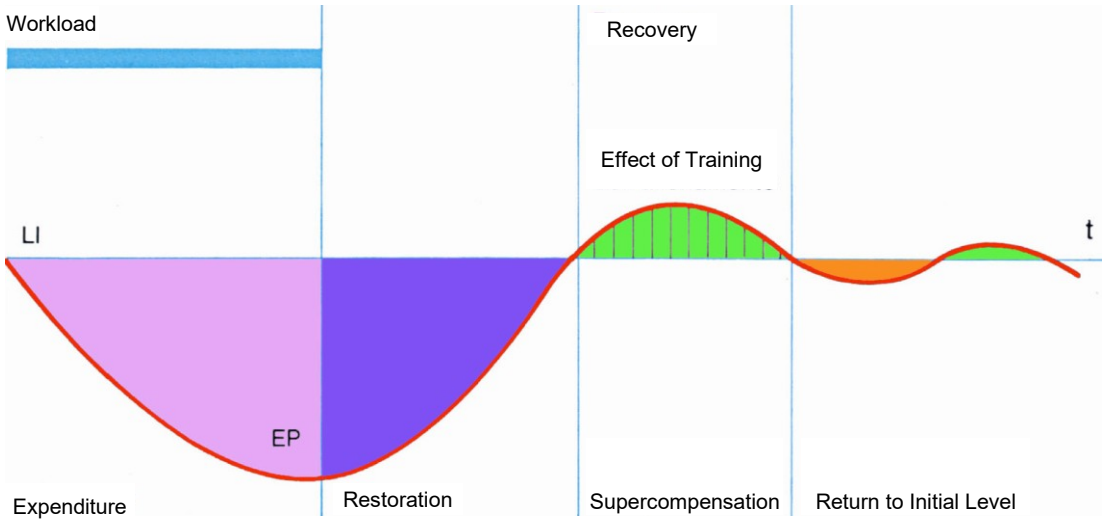
The following figure, presented by Jakovlev (1954), introduces the concept of supercompensation, and represents how the organism's response to an exercise is a specific type of improvement in relation to the stimulus.

Jakovlev's Graph (1954)



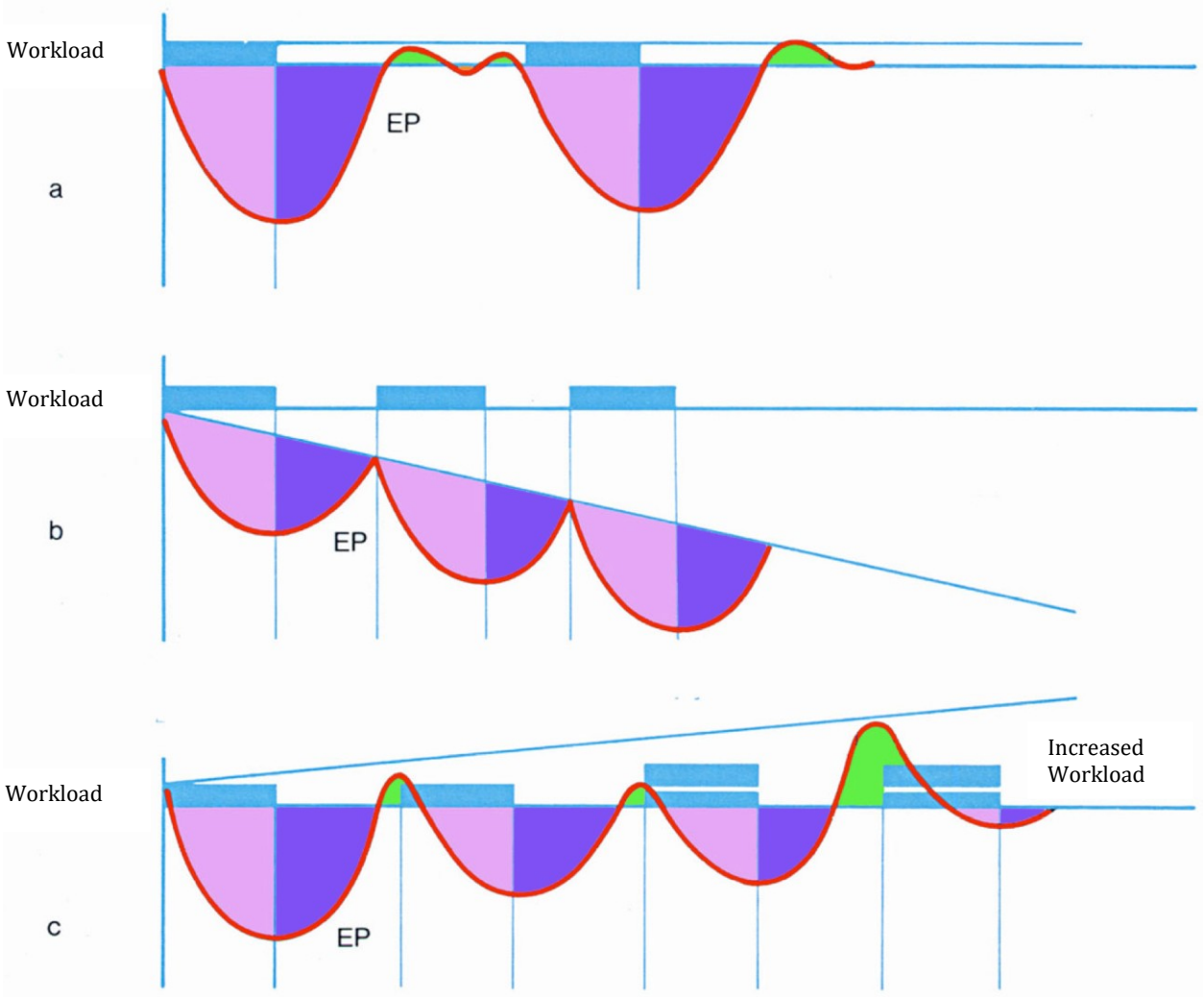
In the following image the concept is further illustrated; it is possible to note how a workload alters the homeostasis and the performance level initially diminishes due to a phase in which energy is expended and then, due to a recovery phase, increases to higher level than at the beginning of the initial phase; all of this due to the supercompensation effect. Successively, if no other stimuli are applied, the organism returns to its initial value.

Relationship between workload and recovery in phases



In this figure the following concepts are illustrated:

- In a: two training stimuli too distant from each other (in time) and lose their efficacy
- In b: two training stimuli too close to each other (in time) to allow for supercompensation
- In c: two training stimuli correctly administered creating an effect of improvement



In this technical-composition discipline, three training phases can be distinguished in a yearly plan with multiple goals, and these are repeated and alternated during the season: general preparation, specific preparation and competition preparation. These periods, given the quantity of competitive appointments during the year, tend to be relatively brief and can be shortened or lengthened based on the needs and the development of the competition season.
The training planning in these periods will include the presence of the following components:

1. *Goals*
   Psycho-motorial, cognitive, affective learning
2. *Contents*
   General development, special, specific, or competition exercises
3. *Means*
   In terms of organisation, equipment, information
4. *Methodology*
   The planification procedures developed with the goal of reaching training goals

The construction of a training plan is the first step towards organising each individual session, based on three aspects:

1. *Planning:* this is the formulation, in an ample space and time period, of intermediate and final goals, as well as a strategy of micro-variation in the training structure. This procedure, aimed at reaching the goal, must take into consideration individual performance level and systematic structuring, and consider the long-term training process. The methodology chosen must be that most suitable to reach the final goal.
2. *Periodization:* It is the statement, within a certain time frame and on the basis of the objectives set out, of the theoretical principles relating to the development of the training workload; the aspects requiring modification, the training equipment and the limitations of the individual are identified. This procedure, aimed at achieving intermediate objectives, divides the long-term training plan into periods within which certain training methods are adopted.
3. *Programming*: this is the concrete construction of the theoretical principles of periodization into a written order, describing training means using a recognisable and evident logic, designed to induce an articulated and measured incrementation in the performance capacity.

The periodization of training is generally annual and involves a temporal succession of periods:
- The preparation period
- The competition period
- The transition period

These forsee, within each, training programmes consisting of a list of scientifically valid activities based on logical principles, with the goal of inducing an articulated and measurable increase in performance capacity. These training programmes, in turn, provide an organisation of training in cycles (usually weekly), formed of individual training units which can last one day or more, structured based on precise scientific principles within which distinct training acitivities with diverse effects are usually included.

These activities can generally be divided into:
- General activity
- Special activity
- Specific activity

The elements of preparation are addressed in three fundamental areas and are structured as below:
- A physical-athletic preparation, including:
  - General elements
    - Articular mobility
    - General coordination
    - Balance
    - Strength
    - Rapidity
    - General stamina
  - Specific elements
    - Reactivity
    - Specific coordination
    - Specific stamina

- A technical preparation, including:
  - General elements
    - Basic technique
    - Rhythm
  - Specific elements

        - Specific technique
        - Choreography

- A psychological preparation, including:
    - Competition preparation
    - Anxiety management
    - Post competition analysis
    - Responsibility management
    - Conflict management
    - Consolidation strategies

Saverio Loria and Zeudi Zanetti

Examples of Activity Programming

The following are examples of activity training programmes; these are obviously examples of an organisation under ideal conditions and so, would have to be adapted to the reality of each couple's necessities and availability; the principles remain and the adaptations must be made bearing in mind the elements discussed in previous paragraphs.

The following is an example of the subdivision in steps of long-term preparation

Steps in long term preparation			
Generalised preparatory cycle 3 weeks	Specific preparatory cycle 3 weeks	Specific preparatory cycle 3 weeks	Competition cycle 2 weeks

The following is an example of the subdivision in steps of short-term preparation

Steps in short term preparation		
Generalised preparatory cycle - 3 weeks	Specific preparatory cycle 3 weeks	Competitive cycle 2 weeks

The following is an example of the subdivision in steps of a competition phase

Competition phase							
Specific Prep Cycle 2 weeks.	Comp cycle 2 weeks.	Specific prep cycle 2 weeks.	Comp cycle 1-2 weeks	Specific prep cycle 1 week	Comp cycle 1-2 weeks	Specific prep cycle 1 weeks	Comp cycle 1 week

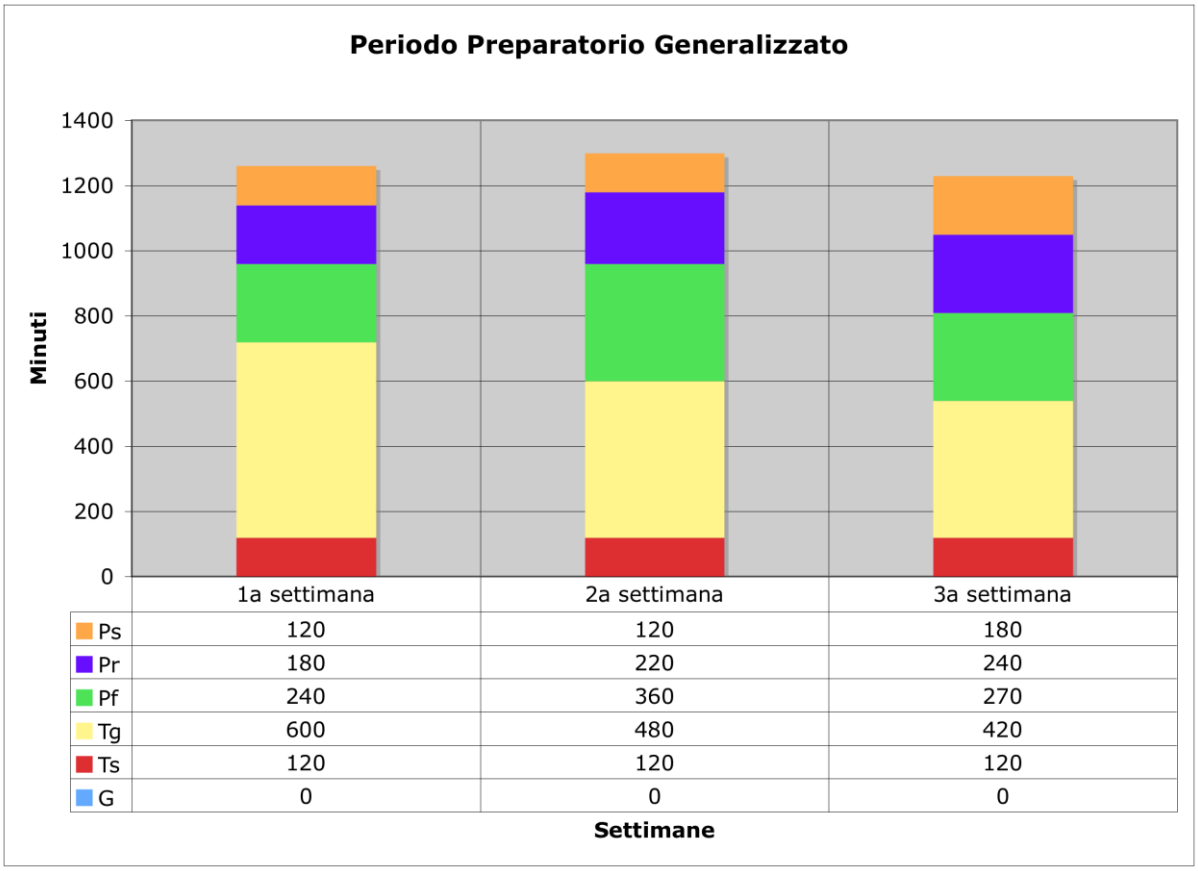
The following legend defines components seen in subsequent graphics and refer to specific training components used in single training periods.

Legend of elements found in figures 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10.

- **G** = Competition
- **Ts** = Specific technique:
  In the general preparation period based on individual components of the technique
  In the specific preparation period and in the competition phase the goal is perfecting the rhythm of execution
- **Tg** = General technique with attention to the pertaining physical qualities
- **Pf** = Physical preparation
- **Pr** = Recovery procedures, autogenous training
- **Ps** = Special training procedures: video, ideo-motorial, discussion, emotional regulation

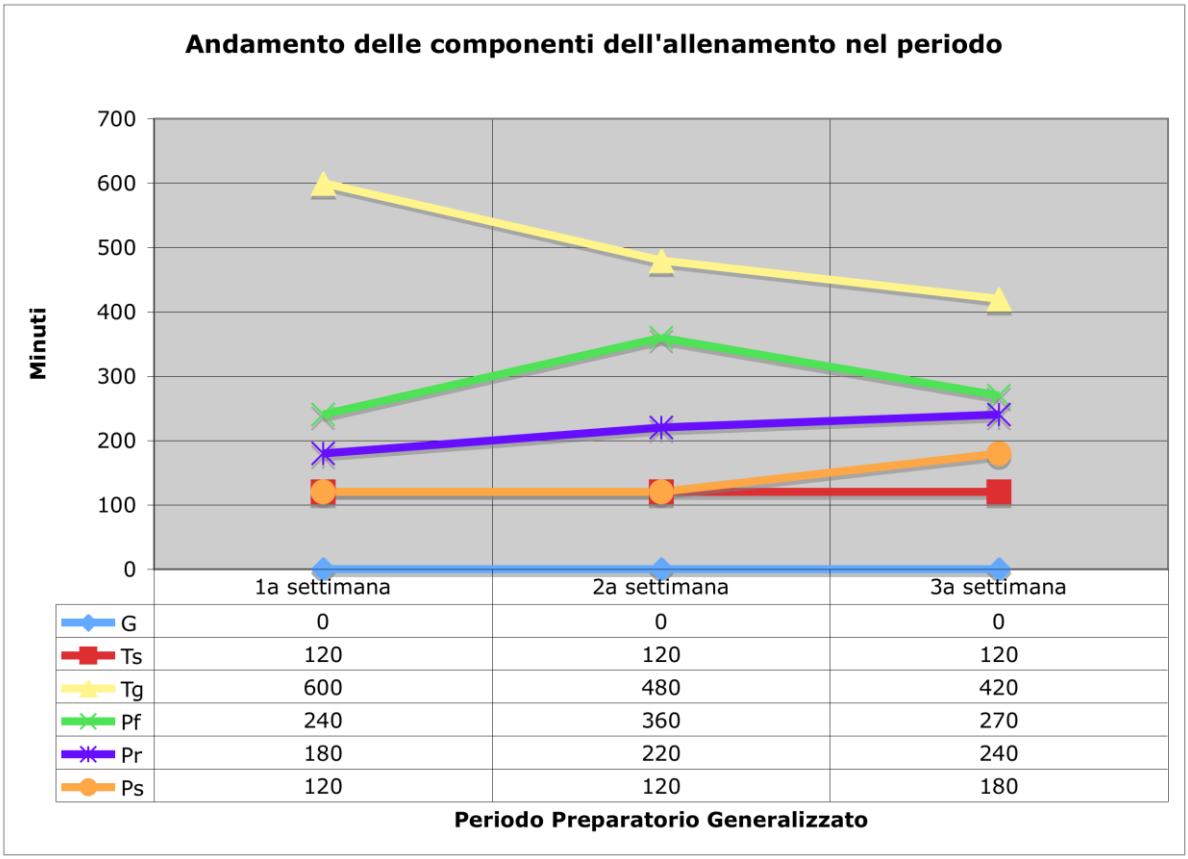
In the graphs in figures 1 and 2, the trends of the training components in weekly micro-cycles during the general preparation phase.

Figure 1 – Trends of training components in each week of a general preparation phase.



	1a settimana	2a settimana	3a settimana
Ps	120	120	180
Pr	180	220	240
Pf	240	360	270
Tg	600	480	420
Ts	120	120	120
G	0	0	0

Figure 2 – Trends of training components during the general preparation phase.



	1a settimana	2a settimana	3a settimana
G	0	0	0
Ts	120	120	120
Tg	600	480	420
Pf	240	360	270
Pr	180	220	240
Ps	120	120	180

The graphs in figures 3 and 4 display the trends of the training components in the weekly micro-cycles during the specific preparation period.

Figure 3 – Trends of the training components during each week of the specific preparation period.

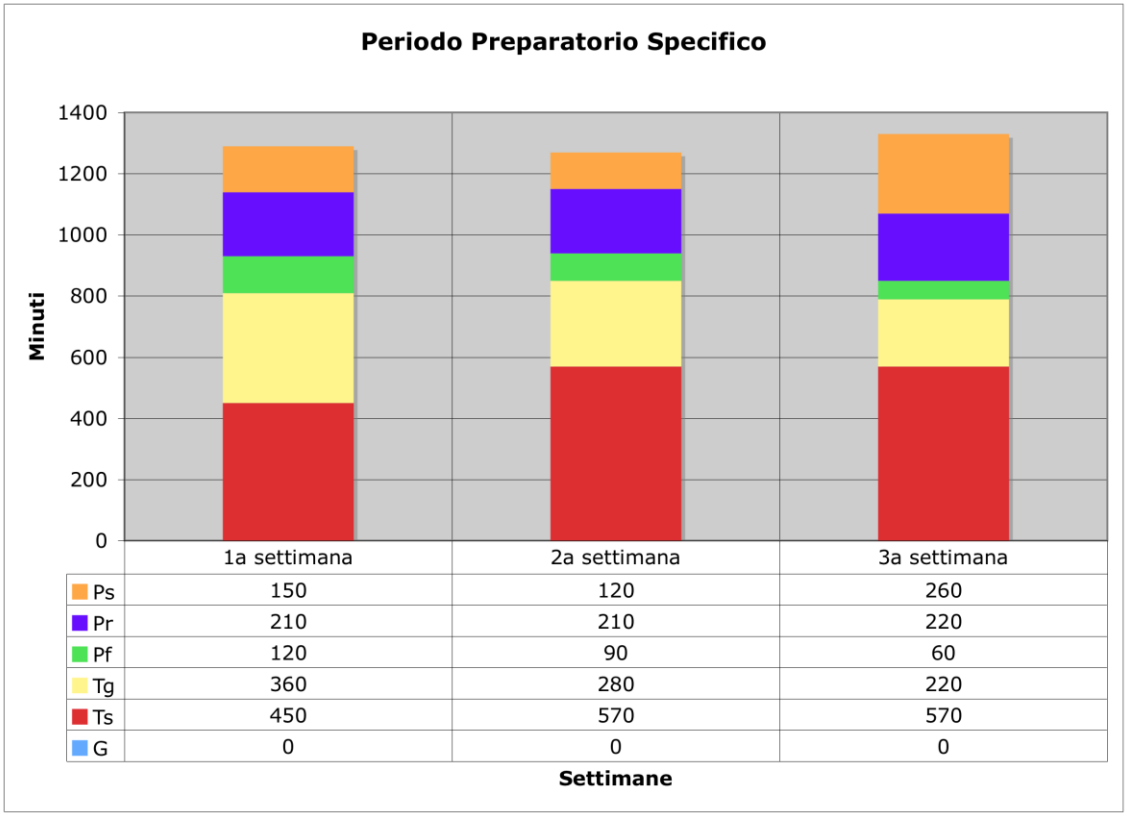
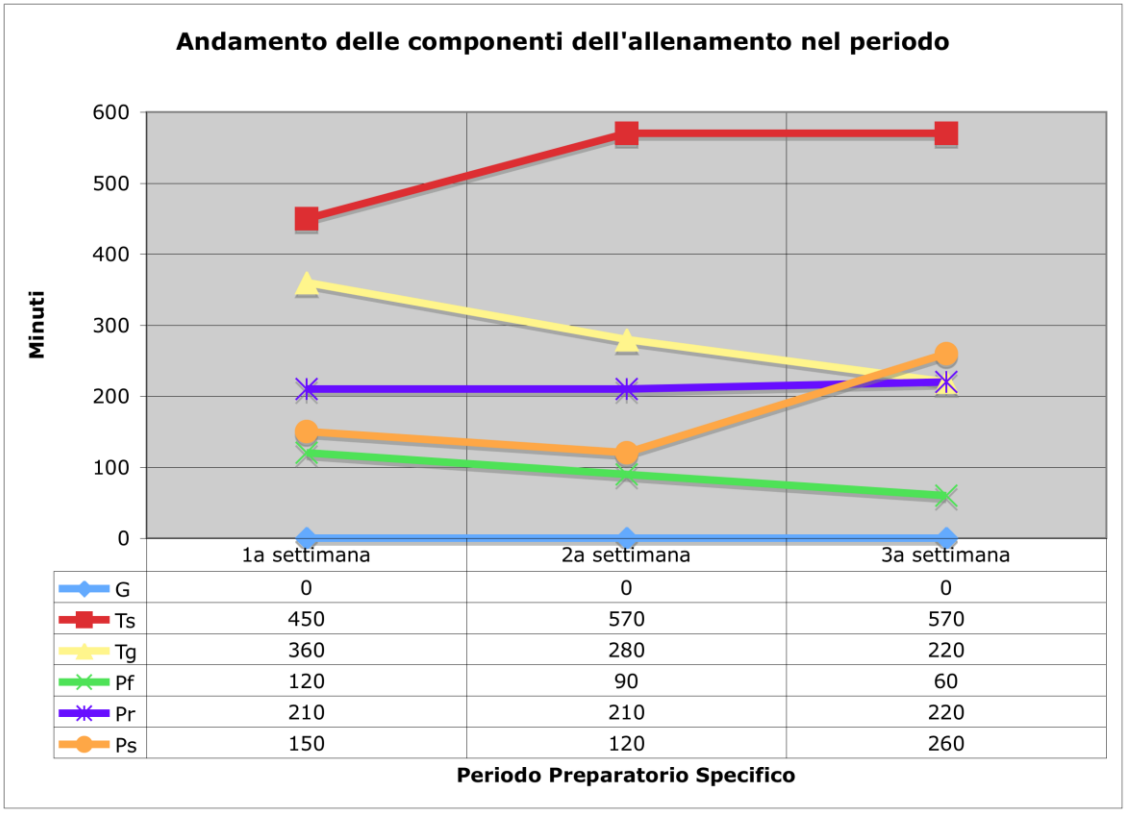


Figure 4 – Trends of the training components during the specific preparation period.



The graphs in figures 5 and 6 display the trends of the training components in the weekly micro-cycles during the competition period.

Figure 5 – Trends of the training components during each week of the competition period.

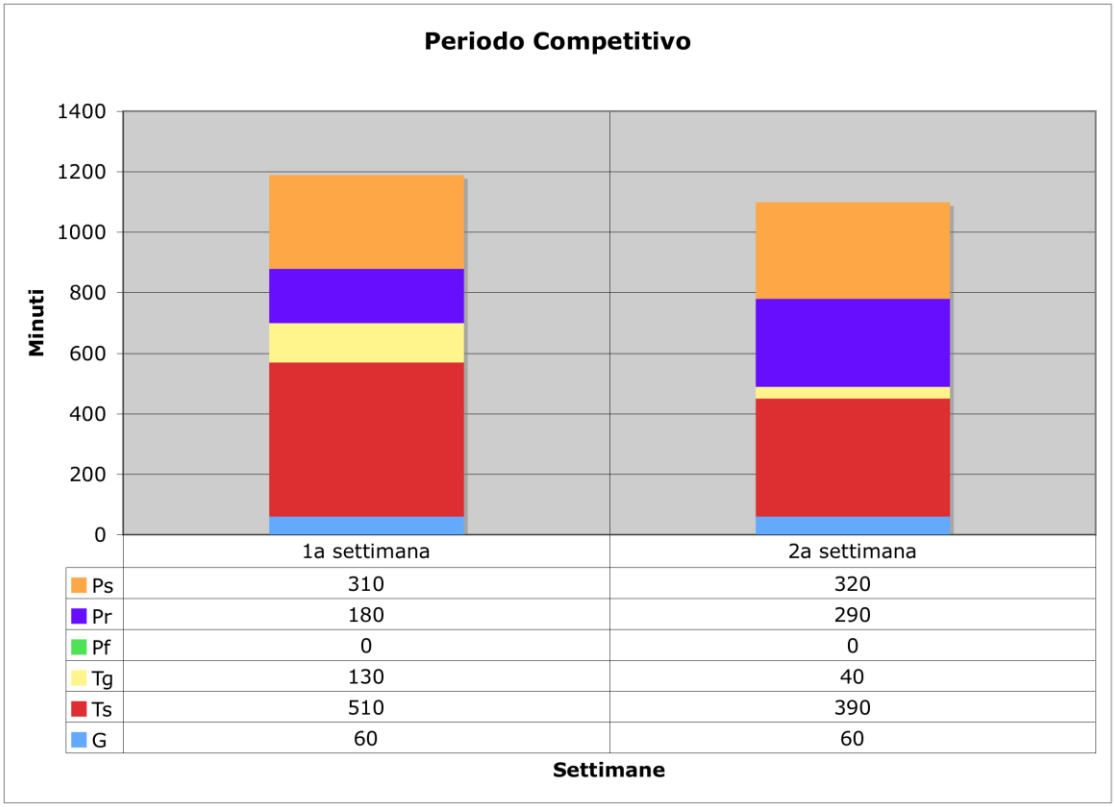
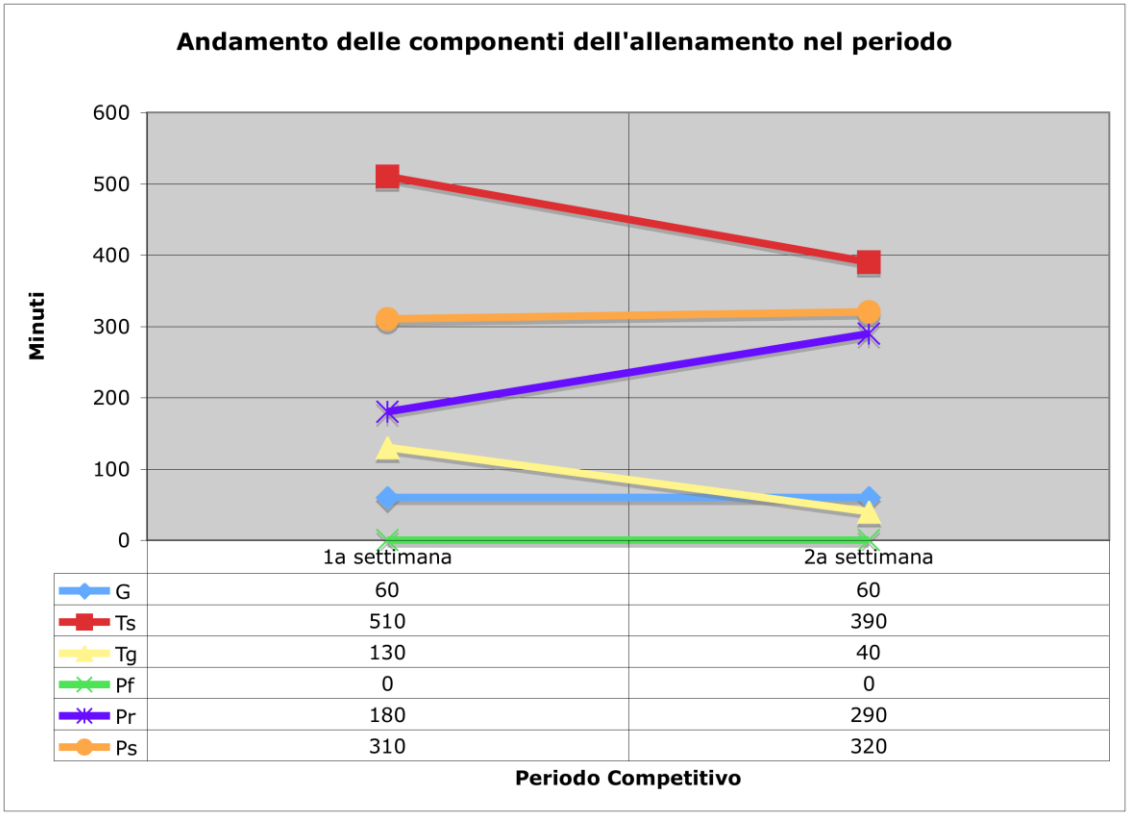


Figure 6 – Trends of the training components during the competition period.



The graphs in figures 7 and 8 display the comparison between the trends of training components during the general preparation, specific preparation, and competition periods.

Figure 7 – Comparison of training components between periods

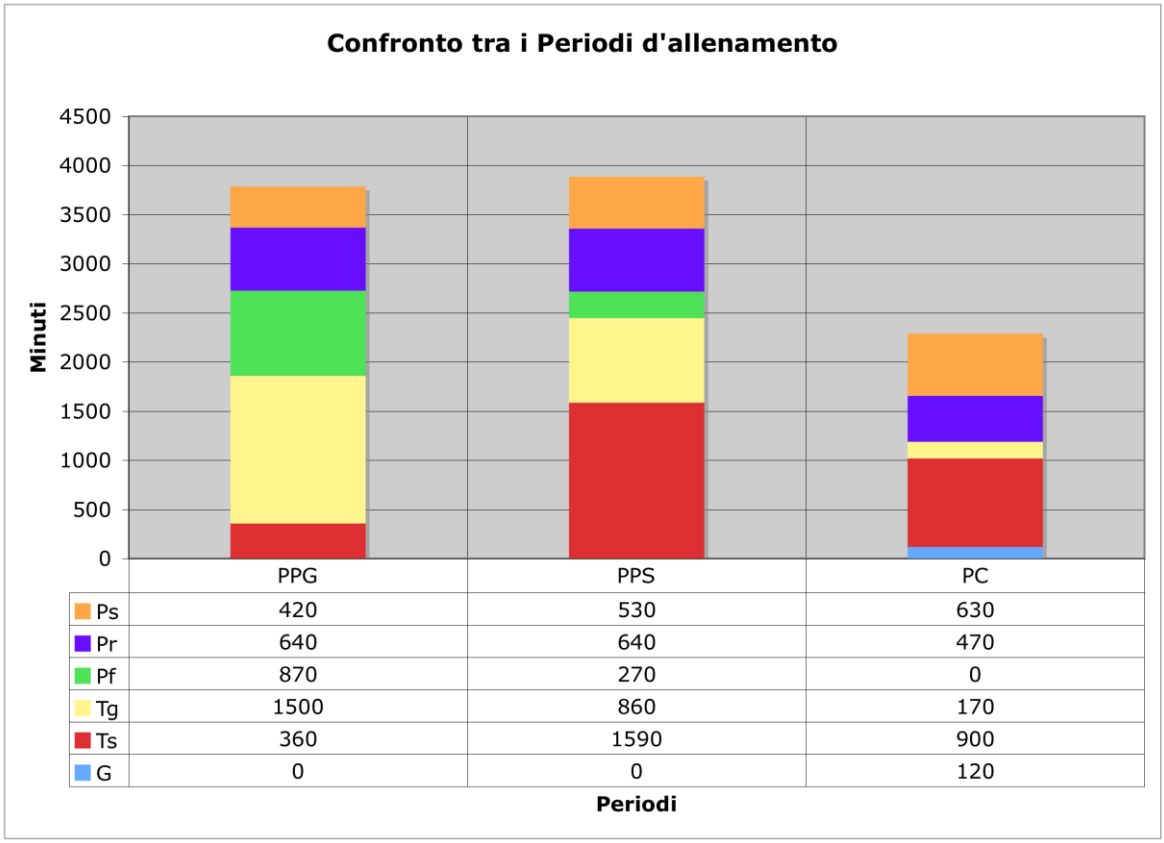
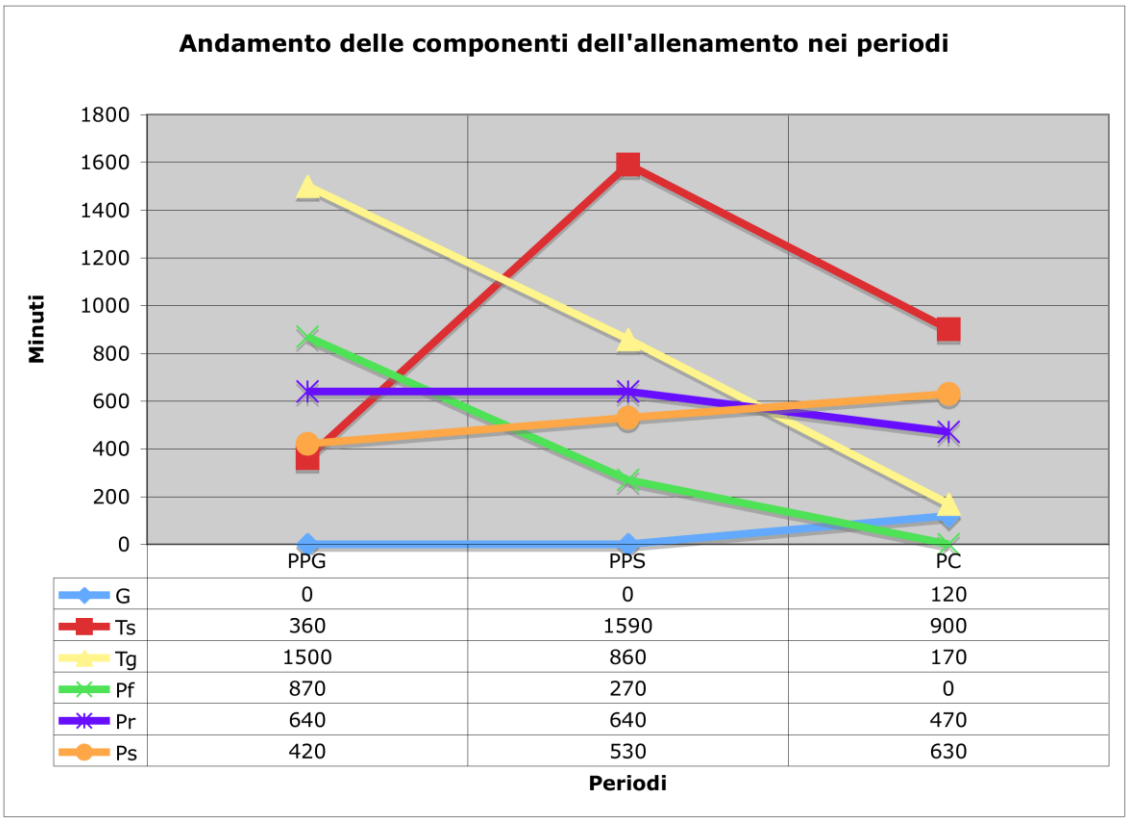
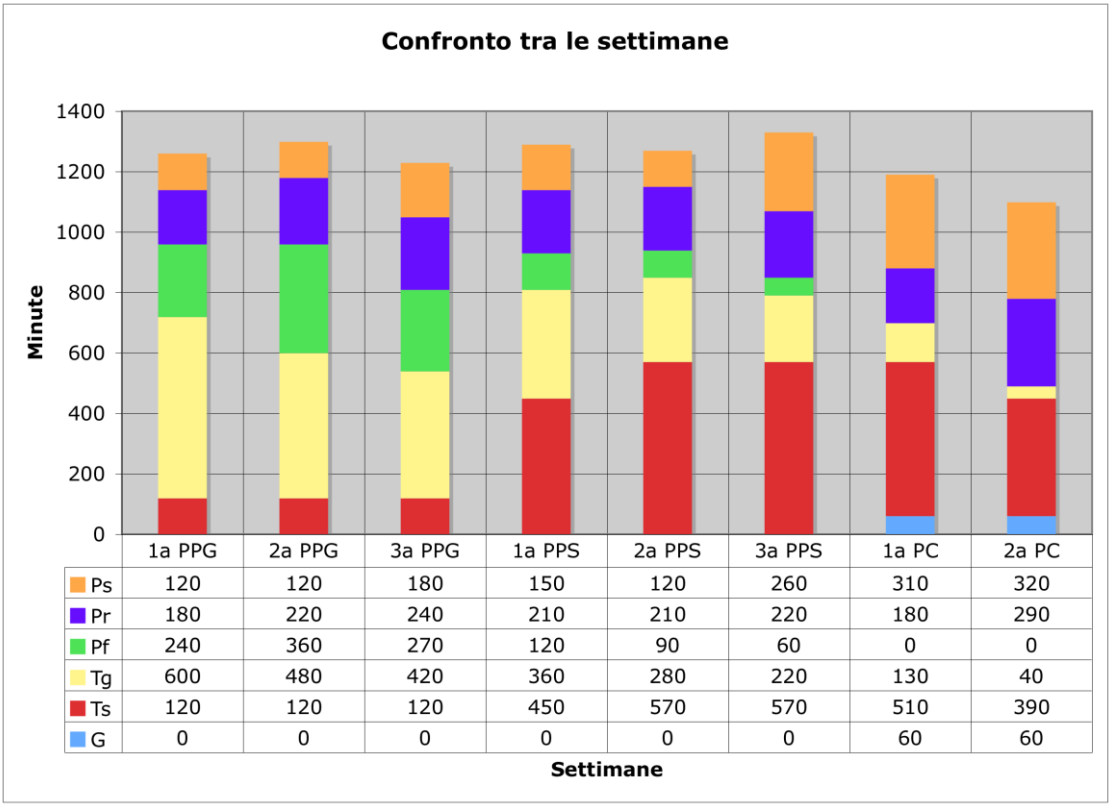


Figure 8 – Trends of training components over three periods.



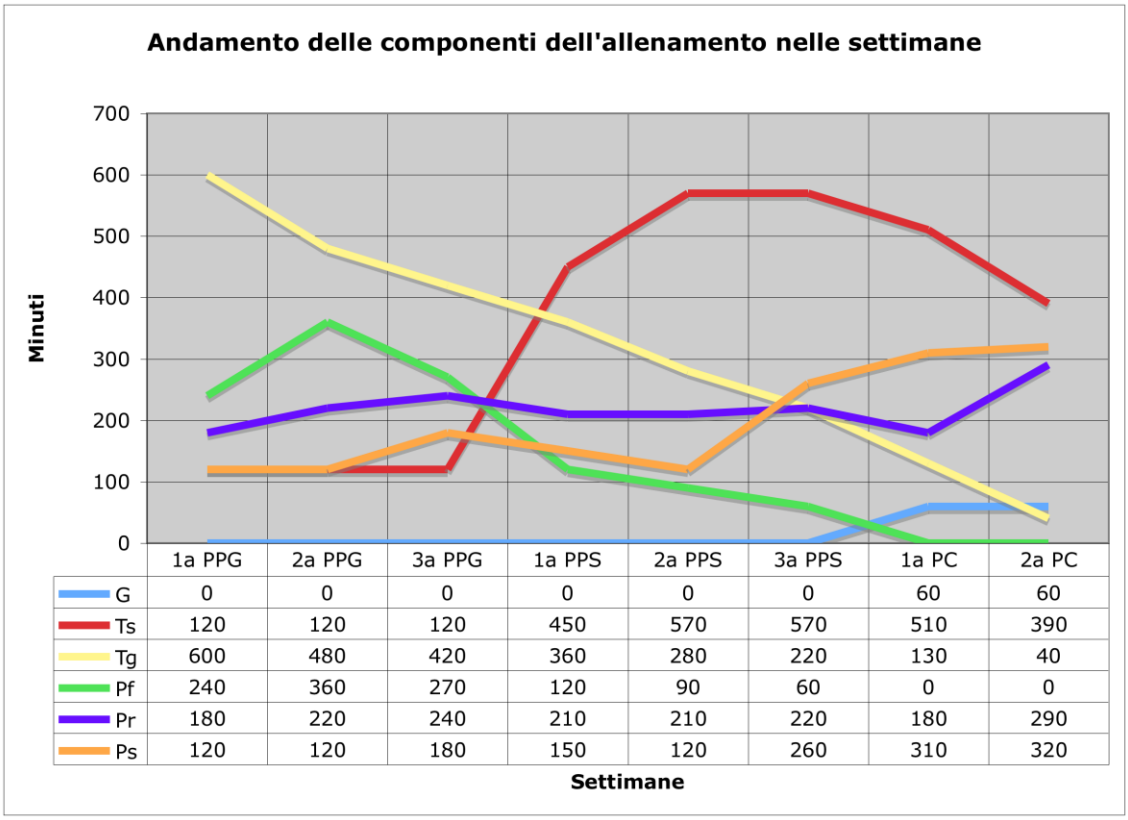
The graphs in figures 9 and 10 display the comparison between the trends of training components during each week of the general preparation, specific preparation, and competition periods.

Figure 9 – Comparison of training components each week



	1a PPG	2a PPG	3a PPG	1a PPS	2a PPS	3a PPS	1a PC	2a PC
Ps	120	120	180	150	120	260	310	320
Pr	180	220	240	210	210	220	180	290
Pf	240	360	270	120	90	60	0	0
Tg	600	480	420	360	280	220	130	40
Ts	120	120	120	450	570	570	510	390
G	0	0	0	0	0	0	60	60

Figure 10 – Trends of training components each week over all periods



	1a PPG	2a PPG	3a PPG	1a PPS	2a PPS	3a PPS	1a PC	2a PC
G	0	0	0	0	0	0	60	60
Ts	120	120	120	450	570	570	510	390
Tg	600	480	420	360	280	220	130	40
Pf	240	360	270	120	90	60	0	0
Pr	180	220	240	210	210	220	180	290
Ps	120	120	180	150	120	260	310	320

In conclusion, athletes acquire a state of maximum form through phases and cannot maintain it for long, tending rather to lose and successively reacquire it through correct and organised training stimuli. The conditional state is verified using the necessary evaluations carried out with tests and compared to that foreseen at the beginning of the cycle. Subsequent analyses allow considerations and corrections to establish criteria for the following cycle.

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Modern aspects in dancesport preparation

Modern preparation in dancesport is effected using dancing elements together with physical-athletic preparation; therefore, dance-based training provides for the development of:

- General resistance
- Specific resistance
- Competition aspects (competition rounds)
- Techinque

In the area of development of high level, technical dance capacity, modern methodology of training dictates that, after physical preparation and technical preparation are done separately in the first years of preparation, these aspects tend to merge to allow an integrated development of the dancing performance in high level couples. The following is a periodisation schema created according to the physical and technical growth in a programme integrating dance-based physiological stimuli.

This periodisation of modern dancesport training foresees periods organised as follows:

1. General Stamina 1 – Technique
2. General Stamina 1 – Specific Stamina – Technique
3. General Stamina 2 – Specific Stamina – Competition rounds – Technique
4. Specific Resistance – Competition rounds – Technique - (if necessary: General Stamina 2)
5. General Stamina 2 – Competition rounds – Technique – (if necessary: Specific Stamina)

In each of the five periods (each with the duration deemed necessary), training sessions are alternated relative to the improvement of several physiological characteristics performed dancing, starting from the development of aerobic stamina and gradually moving towards lactate resistance in the competition rounds, paying particular attention to work and recovery times in order to improve not just the physical aspects, but stimulate the neuro-physiological technique training correctly.

The following are examples of training sessions divided for the targeted component.
These examples have been divided in two parts in terms of quality; the first indicates the type of training proposed for that quality and immediately below, a table with the relative data for that training session is shown. Particular notice should be taken of the data relative to the total effective work time spent dancing in each session and the total training time (that is the total time effectively working summed with the recovery time), from which the relationship between these two times is then calculated and expressed in the last column as the “density” of the session. This allows a comparison between training sessions, indicating which has a higher value, even though both types have very different work and recovery times; in synthesis which training session produces a higher degree of fatigue.

General Stamina 1

3-4 8’ dances, with 2’ recovery between each; 1 or 2 dances alternated
4-5-6 6’ dances with 2’ recovery between each; 1 or 2 dances alternated
1-2 series of four dances (8’-6’-8’-6’) with 1’ recovery between each and 3’ between each series; only 2 dances alternated
2 series of 3 dances (8’-6’-8’) with 1’ recovery between each and 3’ between each series; 2 dances alternated for each series
3 series of 3 dances (8’-6’-6’) with 1’ recovery between each and 3’ between each series; 2 dances alternated for each series

General Stamina Table “1”

N° series	Numer and duration of each dance in a series	Rec. after dance (min)	Total rec. after dances (min.)	Rec. After series (min.)	Tot. Rec. between series (min.)	Total Gen Rec. (min.)	Total work time	Total session time	Relationship Tot. Work / Tot. Session
1	8’-8’-8’	2’	4’	0	0	4’	24’	28’	0,85
1	8’-8’-8’-8’	2’	6’	0	0	6’	32’	38’	0,84
1	6’-6’-6’-6’	2’	6’	0	0	6’	24’	30’	0,8
1	6’-6’-6’-6’-6’	2’	8’	0	0	8’	30’	38’	0,78
1	6’-6’-6’-6’-6’-6’	2’	10’	0	0	10’	36’	46’	0,78
1	8’-6’-8’-6’	1’	3’	0	0	3’	28’	31’	0,90
2	8’-6’-8’-6’	1’	6’	3’	3'	9’	56’	65’	0,86
2	8’-6’-8’	1’	4’	3’	3’	7’	44’	51’	0,86
3	8’-6’-6’	1’	6’	3’	6’	12’	60’	72’	0,83

General Stamina 2

3 dances alternated: 1-2 series of 6 dances (6’-5’-4’-6’-5’-4’) with recovery times of 2’-2’30”-3’ between each dance and 5’ between each series
1 dance per series or 3 dances alternated per series: 2-3 series of 3 dances each (5’-5’-5’) with 2’ recovery between each dance and 5’ between each series
2 dances alternated: 3-4 series of 2 dances each (6’-4’) with 2’ recovery between each and 5’ between each series

General Stamina Table “2”

N° series	Number and duration of each dance in a series	Rec. after dance (min)	Total rec. after dances (min.)	Rec. After series (min.)	Tot. Rec. between series (min.)	Total Gen Rec. (min.)	Total work time	Total session time	Relationship Tot. Work / Tot. Session
1	6’-5’-4’-6’-5’-4’	2’ – 2’30” – 3’	12’	0	0	12’	30’	42’	0,71
2	6’-5’-4’-6’-5’-4’	2’ – 2’30” – 3’	24’	5’	5’	29’	60’	89’	0,67
2	5’-5’-5’	2’	8’	5’	5’	13’	30’	43’	0,69
3	5’-5’-5’	2’	12’	5’	10’	22’	45’	67’	0,67
3	6’-4’	2’	6’	5’	10’	16’	30’	46’	0,65
4	6’-4’	2’	8’	5’	15	24’	40’	64’	0,62

Specific Stamina

2-3 series of 4 dances each (3'-3'-3'-3') with 1'30" recovery between dances and 6' in between each series; 1 dance per series

2-3 series of 4 dances each (3'-3'-3'-3') with 2' recovery between each dance and 6' between each series; 1 dance per series

2 series of 5 dances (3'-3'-3'-3'-3') with 1'30" recovery between each dance and 6' between each series; 1 or 5 dances per series

3 series of 5 dances (3'-3'-3'-3'-3') with 2' recovery between each dance and 6' between each series; 1 or 5 dances per series

5 series of 3 dances (3'-3'-3') with 1'30" recovery between each dance and 6' between each series; 1 dance per series

5 series of 3 dances (3'-3'-3') with 2' recovery between each dance and 6' between each series; 1 dance per series

Specific Stamina Table

N° series	Number and duration of each dance in a series	Rec. after dance (min)	Total rec. after dances (min.)	Rec. After series (min.)	Tot. Rec. between series (min.)	Total Gen Rec. (min.)	Total work time	Total session time	Relationship Tot. Work / Tot. Session
2	3'-3'-3'-3'	1'30"	9'	6'	6'	15'	24'	39'	0,61
2	3'-3'-3'-3'	2'	12'	6'	6'	18'	24'	42'	0,57
3	3'-3'-3'-3'	1'30"	13'30"	6'	12'	25'30"	36'	61'30"	0,58
3	3'-3'-3'-3'	2'	18'	6'	12'	30'	36'	66'	0,54
2	3'-3'-3'-3'-3'	1'30"	12'	6'	6'	18'	30'	48'	0,62
3	3'-3'-3'-3'-3'	2'	24'	6'	12'	36'	45'	81'	0,55
5	3'-3'-3'	1'30"	12'	6'	24'	36'	45'	81'	0,55
5	3'-3'-3'	2'	20'	6'	24'	44'	45'	89'	0,5

Competition Aspects (Competition rounds)

5 series of 3 dances (2'-2'-2') with 1'30" recovery between each dance and 7'-8' between each round; 1 dance per series

5 series of 3 dances (1'30"-1'30"-1'30") with 30" recovery between each dance and 30" between each series; 1 dance per series

3 series of 5 dances (1'30"-1'30"-1'30"-1'30"-1'30") with 1' recovery between each dance and 7'-8' between each series; 5 dances per series

3 series of 5 dances (1'30"-1'30"-1'30"-1'30"-1'30") with 30" recovery between each dance and 7'-8- between each series; 5 dances per series

Rounds Table

N° series	Number and duration of each dance in a series	Rec. after dance (min)	Total rec. after dances (min.)	Rec. After series (min.)	Tot. Rec. between series (min.)	Total Gen Rec. (min.)	Total work time	Total session time	Relationship Tot. Work / Tot. Session
5	2'-2'-2'	1'30"	15'	7'	28'	43'	30'	73'	0,41
5	3 x 1'30"	30"	5'	7'	28'	33'	22'30"	55'30"	0,4
3	5 x 1'30"	1'	12'	7'	14'	26'	22'30"	48'30"	0,46
3	5 x 1'30"	2'	6'	7'	14'	20'	22'30"	42'30"	0,52

Technique
5 series of 3 dances (1'-1'-1') with 2' recovery between dances and 6'-7' between series'; 1 dance per series
5 series of 3 dances (1'30"-1'30"-1'30") with 3' recovery between dances and 6'-7' between series'; 1 dance per series

Technique Table

N° series	Number and duration of each dance in a series	Rec. after dance (min)	Total rec. after dances (min.)	Rec. After series (min.)	Tot. Rec. between series (min.)	Total Gen Rec. (min.)	Total work time	Total session time	Relationship Tot. Work / Tot. Session
5	1'-1'-1'	2'	20'	6'	24'	44'	15'	59'	0,25
5	3 x 1'30"	3'	30'	6'	24'	54'	22'30"	76'30"	0,29

N.B. These examples can be modified based on the necessities of the athlete; they are to be considered purely indicative.

The following is an example of a long term construction work schema articulated in 6 preparation periods and one competition phase; if necessary, some of these periods may be repeated.

Schema 1st period (3 weeks)

Gen. Stamina 1	Technique	Gen. Stamina 1	Technique	Gen. Stamina 1	Technique
1s 6'-6'-6'-6' rec. 2'	5s 1'-1'-1' rec. 2' e 6' 1 dance x series	1s 8'-8'-8' rec. 2'	5s 1'-1'-1' rec. 2' e 6' 1 dance x series	1s 6'-6'-6'-6' rec. 2'	5s 1'-1'-1' rec. 2' e 6' 1 dance x series
1s 8'-8'-8' rec. 2'	5s 1'-1'-1' rec. 2' e 6' 1 dance x series	1s 6'-6'-6'-6' rec. 2'	5s 1'-1'-1' rec. 2' e 6' 1 dance x series	1s 8'-8'-8' rec. 2'	5s 1'-1'-1' rec. 2' e 6' 1 dance x series
1s 8'-8'-8'-8' rec. 2'	5s 1'-1'-1' rec. 2' e 6'-7' 1 dance x series	1s 6'-6'-6'-6'-6' rec. 2'	5s 1'-1'-1' rec. 2' e 6' 1 dance x series	1s 8'-8'-8'-8' rec. 2'	5s 1'-1'-1' rec. 2' e 6' 1 dance x series

Schema 2nd period (2 weeks)

Gen. Stamina 1	Technique	Spec. Stamina	Gen. Stamina 1	Technique	Spec. Stamina
2s 8'-6'-8' rec. 1' e 3'	5s 1'-1'-1' rec. 2' e 6'-7' 1 dance x series	2s 3'-3'-3'-3' rec. 2' e 6' 1-2 dance x series	1s 6 x 6' rec. 2'	5s 1'-1'-1' rec. 2' e 6'-7' 1 dance x series	2s 3'-3'-3'-3' rec. 2' e 6' 1-2 dance x series
3s 8'-6'-6' rec. 1' e 3'	5s 1'-1'-1' rec. 2' e 6'-7' 1 dance x series	2s 3'-3'-3'-3' rec. 2' e 6' 1-2 dance x series	2s 8'-6'-8'-6' rec. 1' e 3'	5s 1'-1'-1' rec. 2' e 6'-7' 1 dance x series	2s 3'-3'-3'-3' rec. 2' e 6' 1-2 dance x series

Schema 3rd period (2)

Gen. Stamina 2	Technique	Spec. Stamina	Gen. Stamina 2	Technique	Spec. Stamina
1s 6’-5’-4’-6’-5’-4’ rec 2’-2’30-3’ 3 dances	5s 1’-1’-1’ rec. 2’ e 6’ 1 dance x series	3s 3’-3’-3’-3’ rec. 1’30” e 6’ 1 dance x series	3s 6’-4’ rec. 2’ e 5’ 1 or 2 dances x series	5s 1’-1’-1’ rec. 2’ e 6’ 1 dance x series	2s 3’-3’-3’-3’-3’ rec. 1’30” e 6’ 5 dances x series
2s 6’-5’-4’-6’-5’-4’ rec. 2’-2’30-3’ e 5’ 3 dances	5s 1’-1’-1’ rec. 2’ e 6’ 1 dance x series	3s 3’-3’-3’-3’ rec. 1’30” e 6’ 1 dance x series	2s 5’-5’-5’ rec. 2’ e 5’ 2 or 3 dances x series	5s 1’-1’-1’ rec. 2’ e 6’ 1 dance x series	2s 3’-3’-3’-3’-3’ rec. 1’30” e 6’ 5 dances x series

Schema 4th period (2 weeks)

Spec. Stamina	Gen. Stamina 2	Comp Round	Technique	Spec. Stamina	Technique
3s 3’-3’-3’-3’-3’ rec. 2’ e 6’ 3 or 5 dances per series	4s 6’-4’ rec. 2’ e 5’ 2 or 1 dances per series	3s 5 x 1’30” rec. 1’30” e 7’ 5 dances per series	5s 4 x 1’30” rec. 3’ e 6’ 1 dance per series	5s 3’ - 3’- 3’ rec. 2’ e 6’ 1 dance per series	5s 4 x 1’30” rec. 3’ e 6’ 1 dance per series
3s 3’-3’-3’-3’-3’ rec. 2’ e 6’ 3 or 5 dances per series	3s 5’-5’-5’ rec. 2’ e 5’ 3 dances per series	3s 5 x 1’30” rec. 1’ e 7’ 5 dances per series	5s 4 x 1’30” rec. 3’ e 6’ 1 dance per series	5s 3’ - 3’ - 3’ rec. 2’ e 6’ 1 dance per series	5s 4 x 1’30” rec. 3’ e 6’ 1 dance per series

Schema 5th period (2 weeks)

Spec. Stamina	Comp Round	Technique	Spec. Stamina	Comp Round	Technique
3s 3’-3’-3’-3’-3’ rec. 1’30” e 6’ 3 or 5 dances per series	5s 3 x 1’30” rec. 30” e 7’-8’ 5 dances per series	5s 4 x 1’30” rec. 3’ e 6’ 1 dance per series	5s 3’-3’-3’ rec. 1’30” e 6’ 1 dance per series	5s 3 x 1’30” rec. 30” e 7’ 5 dances per series	5s 4 x 1’30” rec. 3’ e 6’ 1 dance per series

Schema 6th period (2 weeks)

Gen. Stamina 2	Comp round	Technique	Gen Stamina 2	Comp Round	Technique
2s 6’-5’-4’-6’-5’-4’ rec. 2’-2’30-3’ e 5’ 3 dances	3s 5 x 1’30” rec. 30” e 7’ 5 dances per series	5s 4 x 1’30” rec. 3’ e 6’ 1 dance per series	3s 5’-5’-5’ rec. 2’ e 5’ 3 dances per series	3s 5 x 1’30” rec. 30” e 7’ 5 dances per series	5s 4 x 1’30” rec. 3’ e 6’ 1 dance per series

Schema of the competition week

Stamina	Comp Round	Technique	Stamina.	Technique	Rec.	Comp
5s 3’ - 3’ rec. 2’ e 5’ 1 dance x series	3s 5 x 1’30” rec. 30” e 7’ 3 dances x series	5s 1’-1’-1’-1’ rec. 3’ e 6’ 1 dance x series	2s 1’-1’-1’-1’-1’ rec. 1’30” e 7’ 1 dance x series	3s 1’ - 1’ - 1’ rec. 3’ e 6’ 1 dance x series		

Particular elements for the preparation can be applied in special sessions to stimulate the bioenergetic mechanisms and strength adaption to the maximum; the construction of these special sessions are left, obviously, to the teacher who, conscious of the needs of the couple and knowing the characteristics and the current condition of the couple, may decide to adopt particular strategies. Some examples are:

- To improve the general stamina times can be increased by slowing the speed of the dance, adapting slow dances to stimulate the aerobic resistance level.
- To improve the specific stamina the number of dances can be increased to 10 or 12 in a row, of a 1’ – 1’30” duration each and with up to 3’ recovery time; during the numerous phases of effort, the oxygen debt and lactate production tend to increase, whereas the recovery phase stimulates the aerobic mechanism to pay this oxygen debt, thereby increasing the aerobic power.
- To improve the competition stamina, up to 10 dances can be repeated lasting 45” – 1’ each with equal or lower recovery time, thereby stimulating the lactic acid production.
- A second way of increasing competition stamina is that of doing 5 series of 3 dances (each series should be the same), with dances lasting 1’30” and a maximum recovery time of 20” between each dance and 7’ between each round.
- To improve the technical and coordinative aspects, the same dance can be repeated but with variations of the speed of the music

The Paladanze Complex

Warmup

Warmup includes all actions and measures taken to predispose the organism to sustain a training session or competition in the best condition possible.
It is therefore a series of procedures used to create a psychophysical condition able to participate in an activity with maximum effort and avoiding possible injuries.

Two types of warmup can be distinguished: a general warmup orientated towards sustaining a non-specific, bland activity, and a warmup specific to a certain discipline in question or in relation to a particular goal to be reached, which targets those body sectors especially involved in the required performance through specific exercises.

Warmup procedures include mental activation, an active part (made up of dynamic exercises) and a passive part (with a physiotherapist).

The principal characteristic of warmup is the effective raising of internal body temperature which depends on the duration and type of warmup used as well as the environmental conditions.
Increasing the internal body temperature by 1°C – 1.5°C creates the optimal conditions for those physiological reactions which determine the performance level.

The effects of warmup are as follows:

- Increasing the cardiac frequency and volume
- Distribution of the blood flow with an increase in tissue irroration and dilation of the capillaries, with a relative increase in peripheral oxygenation as well as a better substrate supply necessary for a higher metabolic level
- Steady-State Condition (balance between oxygen absorption and consumption)
- Due to raised body temperature:
    - Higher execution speed of the metabolic process
    - Higher execution speed of the nervous processes connected with excitement production
    - Heightened excitability of the CNS with consequent increase in speed of muscle contraction in terms of action and reaction
    - Increased receptor sensibility
        - With relative improvement in coordination
        - With heightened solicitation levels of muscular fuses (the coordinative performance capacity is up to 50% inferior at 15°-20°)
    - Decreased viscous-elastic muscle resistance
    - Increase extension and elasticity of muscles and tendons
    - Increased synovial liquid production in articulations

The effects of warmup can be influenced by other factors:

- Endogenous; due to age and training form
- Exogenous; due to environmental conditions and the moment of the day

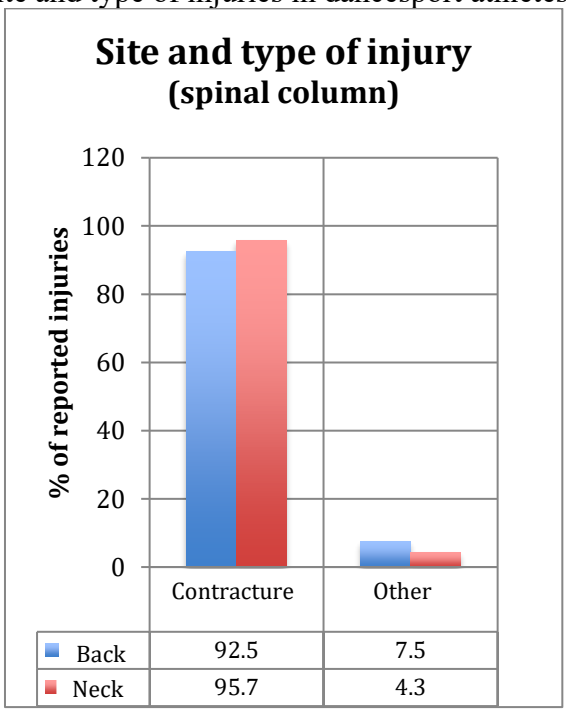
The effects of warmup tend to cease together with the warmup itself; therefore, at the end of warmup procedures, the athlete should begin the competition within 10’ and complete their preparation in this brief period (finish dressing, shoes, drink, go to the bathroom, etc.).
From the measurements of the first dance mentioned previously in the VO2 and lactate research (both in Standard and in Latin American), significant evidence of insufficient or incomplete warmups was noted. This situation occurs in nearly every competition and, if improved, the performance level would almost certainly be affected positively. Team Diablo, having noticed this situation, provided opportune indications to all its athletes to remedy this fundamental aspect.

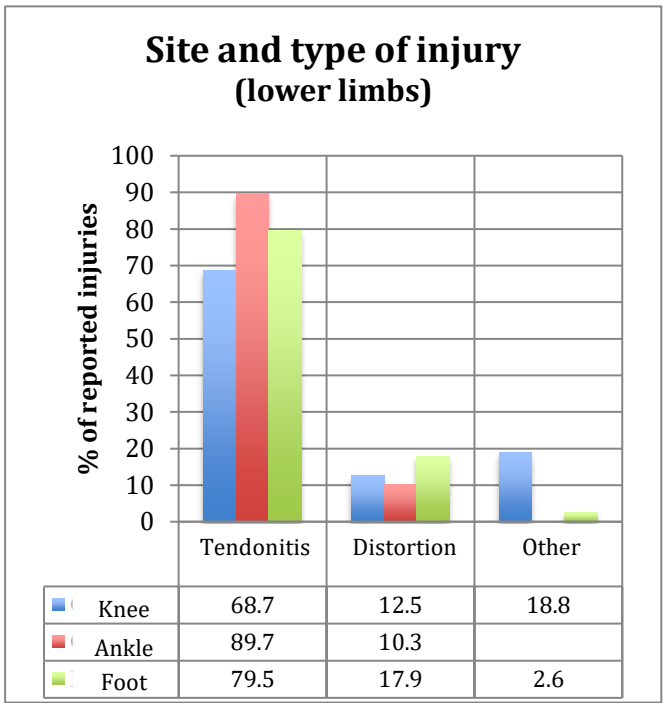
Isaia Berardi and Cinzia Birarelli

Traumatological aspects of dancesport

Dancesport subjects the osteoarticular structures to considerable stress which, if not sufficiently treated or prepared for with an adequate warmup before training or a competition, can cause various types of trauma.
As already stated, the postures and technical actions, especially when highly dynamic, require the support of an adequately prepared physique, the lack of which heightens the injury risk level to that of contact sports.
Investigations into this aspect have shown that dancers tend to suffer injuries at least once in their career, and that these tend to be varied; the areas involved tend to also vary, but injuries to the cervical and lumbar areas of the spinal column and the feet and ankles (see following table) are particularly frequent, and the most frequently reported pathologies were overload syndromes and articular trauma.

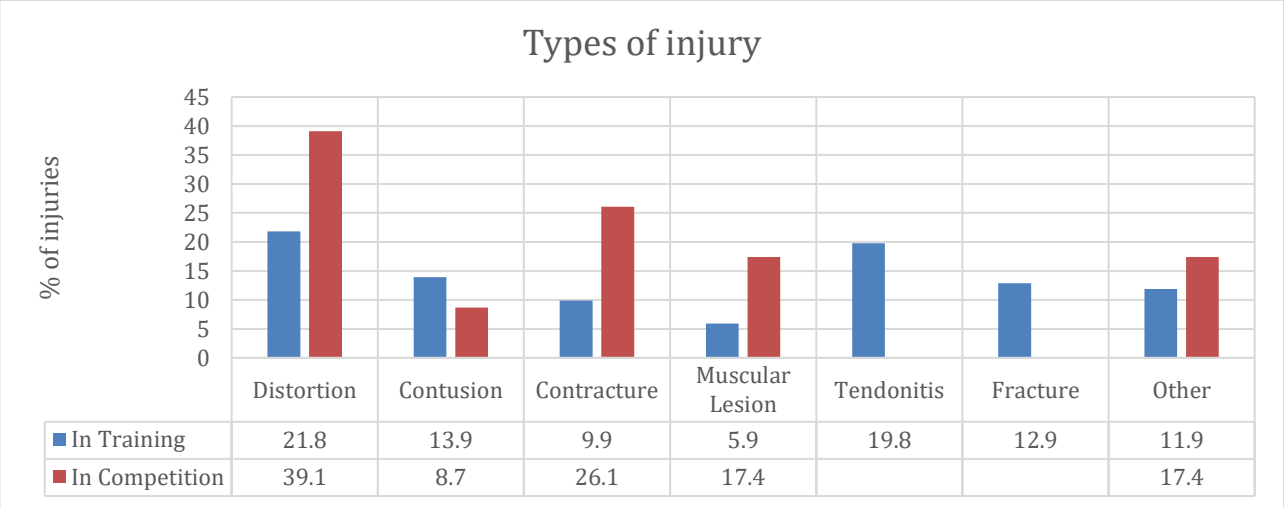
Site and type of injuries in dancesport athletes

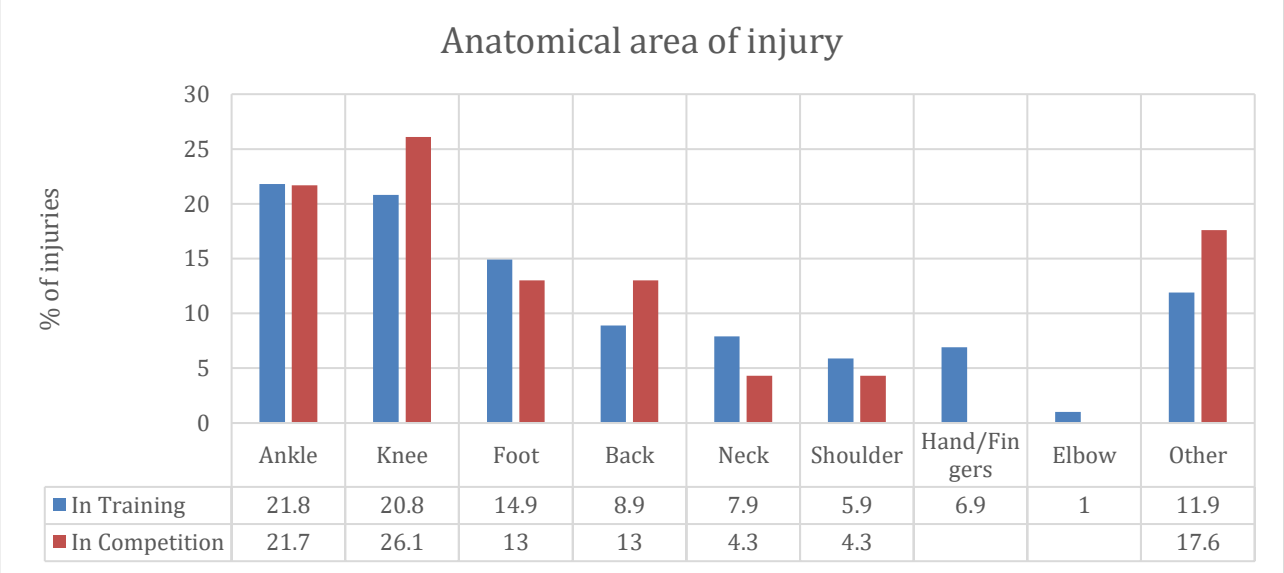




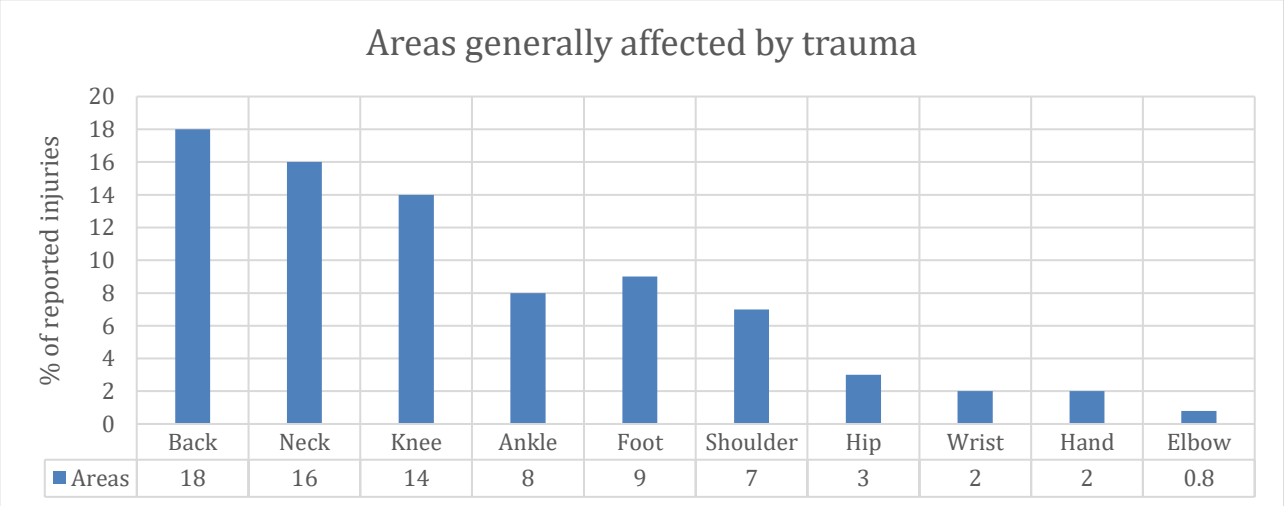
The painful syndromes most frequently encountered were mostly due to a functional overload of the spinal column where lumbago and cervicalgia occurred; the former a characteristic of Latin American athletes and the latter more frequent in Standard athletes.
Functional overload due to continuous and repeated stress on the intervertebral articulations of the lumbar-sacral and cervical sections of the spine, especially because of violent movements made in hyperextension (movements which characterise the dances themselves, and are often executed when landing from jumps and in obligatory postures), are to blame for these types of syndrome.

At this point it is important to state that Team Diablo athletes are less subject to physiotherapy, precisely because they treat, in their physical preparation sessions, the prevention of these types of trauma with ad hoc protocols to counter the onset of painful syndromes through reinforcement of the osteoarticular and muscular structures necessary for the "critical" movements used in dancesport. Team Diablo is equipped with a physiotherapy facility for the treatment of athletes who complain of particular symptoms or syndromes, where specialist staff carry out specific treatments ranging from global posture re-education to local intervention.
The following tables show the types of injuries more frequently encountered in practice and in competition and the relative interested anatomical regions.





In the following table the outcome of an investigation into the areas generically affected by painful symptoms in dancers is shown.



The foot and relative pathologies related to the type of footwear worn by dancers is worth mentioning. The foot is a complex structure made up of 26 bones and 29 articulations; it is a very strong structure and is strongly solicited in normal locomotion and in dancing undergoes conservable stress. The foot,

which must adapt its attitude to its position and placement which is extremely variable during dancing and must also cushion and absorb incredible pressure during dynamic actions and jumps, tends to suffer from pathologies of dermatological and traumatological origin:

- At a dermatological level: blisters, sores, calluses, verrucae, warts, corns, onychophagy (traumatic and infectious).
- At a traumatological level: tendonitis, stress fractures, plantar fasciitis, osteochondrosis, bunions.

The characteristic dance shoes, especially for lady dancers, are, at least from an orthopaedic point of view, "incorrect", and tend to accentuate the formation and accentuation of bunions.
It is essential, therefore, to ensure that the correct attention is placed on the foot in order to avoid pathologies which, even at a simple level, can lead to the interruption of dance activity.

Vincenzo Mariniello and Sara Casini

Marco Cavallaro and Letizia Ingrosso

Psychological aspects in dancesport

For years, Team Diablo's athletes have been trained in psychological aspects especially regarding mental concentration and recovery of nervous energy.
From observation of these athletes, in competition and in training, several differences were noticed which influenced, often negatively, the reactions of athletes and, consequently, their performances. To facilitate and optimise the athlete's conditions in competition and during their preparation, test procedures were adopted for athletes and couples, allowing for simple analysis of the real physical, mental and emotional abilities/capacities which can affect said conditions both positively and negatively.
The analysis of these test results offers teachers fundamental elements to facilitate communication and, consequently, to obtain better results through targeted language.

It should be noted that the characteristics emerging from the analysis of these tests are not necessarily positive or negative, but are uniquely able to provide indications about the subject's physical and psychological preparation, highlighting the perception of stress in both individual and couple, (working in couples is itself stressful and elements of fear, when accumulated, are often exteriorised and reciprocally offloaded), and evaluating the relative reaction to stimuli.

In conclusion, these tests can provide information on certain characteristics without expressing judgement. Furthermore, indications can be extrapolated for teachers about which lingual form to adopt and which procedures can be used to improve preparation and, consequently, the performance.

The psychological tests adopted for dancesport athletes relate to three specific aspects:

- The Psychological Performance Inventory test
- The potential intelligence test
- The perception-reaction test

1) The "*Psychological Performance Inventory*" test (or PPI), evaluates the ability of an athlete to perceive and classify their own emotions at work and their capacity to self-evaluate their own (physical and mental) resources during training, before a competition and during a competition. It measures the abilities and emotions used during an athletic performance.
This test is formed of a 48-point questionnaire to which the test subject responds by indicating a frequency value (from 1 = never to 6 = always) describing their experience in sports. The questionnaire allows the detection of 8 scores (mental abilities) which can be grouped into two major categories: cognitive abilities and emotional abilities. Specifically, it is possible to measure aspects such as: trust, courage, distraction control, the presence of difficulty and fear before and during a competition, reactive capacity, worries and concentration disturbances.

The specific aspects of the two macro-categories can be summarised as follows:

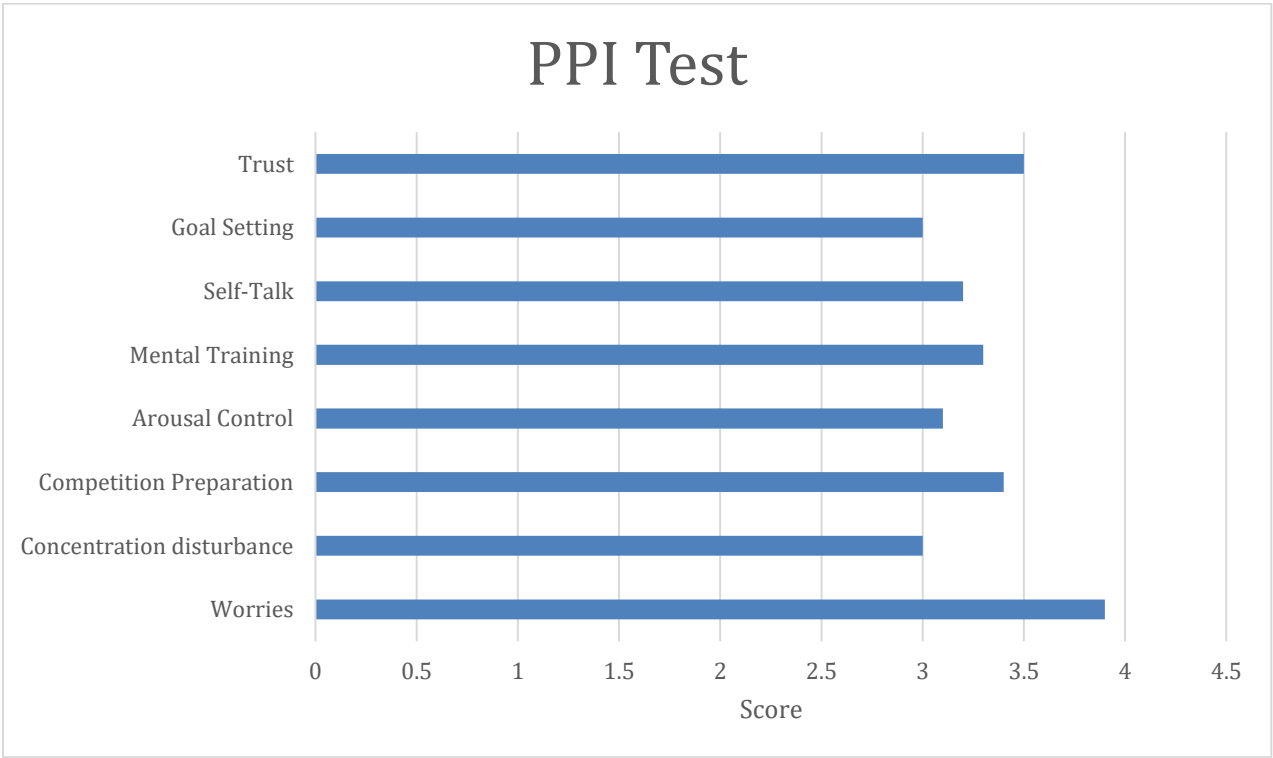
- Cognitive aspects:
    - *Competition preparation:* reflecting the perseverance and effort of the athlete in training and their capacity to reproduce the psychological conditions of the competition in practice.
    - *Goal setting:* based on the ability of the individual to define adequate goals in terms of performance and result to be achieved in a determined time period (distinguishing short term, medium term and long term goals); a goal should be:
        - SMART – Specific, Measurable, Action-based, Reachable and Time defined
    - *Mental training:* the capacity of the athlete to visualise one of more abilities or an entire performance mentally.

- *Self talk:* how much the athlete can control their inner dialogue, a fundamental ability required for maintaining concentration.

- Emotional aspects
  - *Trust:* the expectation that an athlete has in relation to their own physical and mental competence.
  - *Arousal control:* the capacity of the athlete to maintain an optimal psychophysical activation level.
  - *Worry:* referring to the concern of the athlete in relation to a sports event and at the level of fear of being judged for an error (in this case the athlete, while not risking errors, tends to not express their full potential).
  - *Concentration disturbance:* referring to the inability of the athlete to resist distractions (e.g. the public).

The factors *Trust, Goal Setting, Mental Training, Self-Talk, Arousal Control and Competition Preparation* determine the conditions for a good performance.
The factors *Worries and Concentration Disturbance* influence the performance negatively.
The following graph shows an example of a test, the analysis of which can lead to the creation of a specific intervention aimed at improving the mental and performance abilities of the subject; in the specific example below, the goal is to:

- Improve (raising the values of) the first six factors.
- Diminish (lower the values of) the last two factors (*worries and concentration disturbance).*



Within the questionnaire, some questions highlight negative aspects; this is to demonstrate (if this is truly still necessary), the non-existence of a perfect athlete, but that every athlete has both positive and negative characteristics which concurrently make up the individual balance without which the athlete would be compromised.

2) The *"potential intelligence" test* (or TPI), evaluates the level of logical capacity of each athlete and their ability to modify their own preconceived ideas (or fixations) so that the teacher or coach can achieve knowledge transfer quicker and the athlete can obtain results faster. This result, integrated and compared with other tests, allows the evaluation of the real cognitive capacity for adaptation both to situations and to fatigue. It indicates, furthermore, the real capacity of the test subject to make adequate and necessary changes to achieve better results. This test is helpful for physical training in that an excessive stress level could indicate that a subject has reached a personal limit and would not improve further under continued stress.

There is a large amount of methodological literature regarding the application of this test: for cognitive modification and situational adaptation in the field of learning and couple therapy.

The TPI is effective as an instrument to measure the cognitive modifiability and elasticity in the adaptation to new situations, especially in young subjects; it is a "dynamic" test in that, apart from measuring the results obtained in the various trials, there is also a teaching procedure within the situational test which allows the evaluation of the potential development (aside from the development already reached) and to avert the risk of erroneously obtaining inferior results, not because of real intellectual problems, but to do with possible socio-cultural disadvantages. The test is adaptable to different types of subject: with normal performance (to verify potential intellectual development), subjects with disadvantages due to their social or cultural background (which can determine lower results in traditional tests), subjects with learning difficulties and disabilities and gifted subjects with low performance levels. The simplicity of this test's administration and interpretation of its data makes the TPI a simple tool to use.

The application of TPI in couples is also known as ICT (Integral Couple Therapy) and is built around three problems that the couple takes from one session to another:

- *Discussion* during the session about general and specific situations which have arisen around the subject.
- *Situations in which the problem occurred* and was solved successfully.
- *Situations* which could be called "positive".

At the beginning of the therapy, the first will be the most frequent, moving gradually over time to the second. There are three central strategies used to work with acceptance:

- Empathic joining
- Unified detachment
- Tolerance

The goal of the first two is that of uniting the couple around the problem; that is, the problem is used to create unity. In this case, the goal is to transform the negative behaviour of each partner into less damaging behaviour (Jacobson e Christensen, 1996).

In empathic joining, the intention is to generate acceptance by putting the behaviour of the member of the couple in context with their own personal history. What it does is contextualise the behaviour that is considered problematic with the way the problem was originally expressed. Thereby, the negative behaviour is seen as part of their differences.
Jacobson e Christensen (1996) refer to an acceptance formula:
PAIN + ACCUSATION = CONFLICT

PAIN - ACCUSATION = ACCEPTANCE
The couple must be encouraged to express their feelings which are usually left unsaid and which should solicit a more empathic response from the listener.
So, in the end, the principle goal of TPI is to transform couple crisis situations into a "vehicle for intimacy".

Unified detachment is oriented towards helping couple to face problems together. That is, it is a matter of their being about a negative incident when it arises as if it were "it" (Jacobson and Christensen, 1996). The aim is to render the members of the couple more aware of the processes that occur in negative interactions, so that they may distance themselves and not be controlled by the emotions that arise in that moment.

Tolerance strategies are put into practice when the acceptance strategies have not worked as expected, and the goal becomes tolerance of the other person's behaviour rather than the acceptance of it. The goal is to allow the couple to recover from conflict as quickly as possible. The same type of acceptance is not reached as with the previous techniques, but the adverse effects are lessened. (Jacobson e Christensen, 1996).

In conclusion, the *change mechanisms* at the base of each treatment are different from one another: one is based on the change in behaviour, and the other on the acceptance of the behaviour of the other component of the couple; the latter is the factor than seems to influence the long term maintenance of the improvements reached during the therapy.

3) The *"Perception-Reaction"* test (PRS), highlights the way the subject reads reality and the consequent reactions that are used to reach a result. With this test, two types of PRS are put into evidence:

- Global-Intuitive (IG)
- Differentiated-Analytical (DA)

Subjects with an *Intuitive-Global (IG)* PRS highlight their capacity in alternate moments of high excitement and effort with static and distracted moments. They tend to invent imaginative solutions but, to do this, use a lot of energy and need to recover this often. They tend to have a loose thought pattern and are therefore able to change ideas rapidly when they have an intuition, or if they understand they are on the wrong path. This cognitive flexibility tends to allows them to correct themselves easily in order to obtain the results they desire.

Subject with a *differentiated-analytical (DA)* PRS perceive reality analytically and react slower but with more attention. Their activity levels are consistent when trying to reach an objective. They tend to be tenacious and determined, and plan each phase to reach a goal. They know how to listen to others' proposals and try to integrate them with their own ideas, but often try to impose their way of reaching goals and insist until their SPR prevails in relation to others. However, when they learn a method, they make it their own very easily.

The subject, based on the "perception-reaction system" typical of their way of being, elaborates "*tentative solutions"* to problems encountered; these solutions, however, in their dysfunctional redundancy, tend to preserve and aggravate problems rather than promote their resolution.

The perception-reaction system is made up of the *human mind's capacity for self-deception used in peculiar perceptive grids,* through which every human interprets and constructs their "personal" reality attributing environmental stimuli with meaning and cognitive-emotional value which are particular and

subjective, and from the reactions or attempted solutions, so from those efforts to resolve the problematic situation which, even though done with the best intentions, reveal themselves to be failures, tending to cement the subject in their own dysfunctional condition rather than alleviate them from it.

These are transformed into *redundant models* to confront any existential condition, and its use becomes advantageous and reassuring for the subject because they have already used them in the past, representing for the neurophysiological structure of the brain comfortable heuristics or reactive "shortcuts", even if these models, which may have functioned in the past, are no longer adequate for the situation at hand.
The disturbance is, in fact, determined by the triggered process of action and feedback, which flows into the individual perception-reaction system, and is maintained by the attempted solutions adopted to solve problems.
The term "attempted solutions" refers to those behaviours put in place by individuals to face their own difficulties; solutions that end up being reinforced, creating dysfunctional models of perception of reality and consequent psychological difficulties.

To help the individual and the wider system to which they belong (couple, family, etc.) let go of these redundant solutions, Watzlawick e Nardone (1990) suggest the use of ploys based on "problem solving strategies", a rapid and effective method to get rid of the encountered problems.
The strategy is, therefore, a "restructuring" of the way the patient perceives reality, the meanings given to things, and connected behavioural reactions. To do this, it is important to "break the feedback cycle" which holds the problematic situation, stopping the use of solutions used in the past and finding new ones. It is therefore a question of entering into this dysfunctional system, allowing a restructured vision of life, an alternate point of view; but also to solicit new solutions and functions for the resolution of discomfort.

Perceiving a fact, a situation, a person or a solution in contact between us and the world, immediately refers us to how we react to resolve that which we feel to be a problem in that moment. Perceiving means having an idea and vivid emotions at its appearance, at its thought or when evoked. In a mind in which strong rigidities remain about change, responses tend to be slow and crystallised and, instead of changing in the face of new demands, tend to be adaptations of old responses and solutions. The result is that we remain within our own perspective, frozen by its usual answers, enclosed within schemes that we ourselves tend to produce as the best possible solution found up until that moment.
The solution is to find a new reality.

Simone Corvini and Michela Natali

Nutritional Aspects of Dancesport

Dancesport is a discipline which requires of its athletes a considerable amount of effort from a physical point of view. To carry out all expected activity relating to the discipline (physical preparation, lessons, performance training, competitions, etc.), dancers need proper sustenance to adequately support them while conserving good health and perfect physical efficiency. To achieve this, the athlete must maintain a healthy and correct lifestyle, abiding by certain rules, including those of a correct diet.
Scientific studies have shown that most dancers do not have an adequate caloric and nutritional intake for the activity performed and that this produces a higher than ideal fat mass level, even while remaining within the desired weight bracket.
Dancesport training is challenging and proper nutritional must support the athlete, with a correct intake of nutrients, during the different phases of competition preparation.
It should be noted that prolonged dietary imbalance produces disturbances in the organism which tend to manifest in loss of muscle mass, low fatigue recovery capacity and a relatively dangerous increase in injury risk.
Overeating and obesity is the most common problem in society today but, in the world of dancing, the problem tends to be quite the opposite, in that dancers tend to not eat enough in the quest for a thin physique.
Unfortunately, nutritional disturbances are also common; there have been many cases, in fact, of dancers (especially female) who skip meals in order to not gain weight or induce vomiting, take laxatives and use rubber clothes to sweat, causing nothing more than dehydration. It is not appropriate to dwell on the negative physical and psychological damage that this type of behaviour can cause to these individuals, but it is enough to say that for many of these subjects, psychological support is often necessary as well as the "restoration" of a proper diet.
Having a toned and muscular body is ideal to obtain elevated performance levels, but an inadequate diet with deficits regarding nutritional elements, vitamins, salts and minerals and calories translates into fatigue when performing required activities, risking damaging the growth process for adolescent subjects and health in general. A body with excess weight, on the other hand, due to an incorrect diet with excessive caloric intake or with an incorrect proportion of nutrients (for example excess fats and carbohydrates in relation to proteins), fatigues the body, making dancing correctly difficult, and in fact impeding high level performance and excessively soliciting the body's energy mechanisms, with obvious consequences to the locomotive apparatus.
A dancer's diet should be made up of a balanced intake of carbohydrates, proteins, fats, vitamins and minerals and adequate liquid.
The correct balance of nutrients should follow this schema:

- Carbohydrates, 50-65%
- Fats, 15-30%
- Protein, 15-25%

These percentages are calculated based on the energy expenditure of an athlete and vary based on the daily requirements of an athlete which can fluctuate according to the training period, competition period, or specific needs of the athlete, and in any case, these nutritional strategies must ALWAYS be implemented by a specialist in nutritional medicine.
In addition to caloric nutrients, non-caloric elements should be included:

- Water
- Salts and minerals
- Vitamins

A general recommendation is that of dividing the necessary caloric intake over several meals during the day without ever skipping main meals, that is breakfast, lunch and dinner.

The calculation of the quantity necessary for each person is done based on age, weight, height and gender of the subject, and considering the quantity and intensity of their daily activity. There are

modern methods for the bodily composition evaluation, particularly the basic metabolism of the individual and metabolic measurement of their strength.
In general, to stay in form, average daily activity requires about:

- 40 calories per kilogram of weight for females
- 45 calories per kilogram of weight for males

In general women tend to require less calories than men, but these values change in relation to age; for example a young subject has a higher daily intake due to their constant growth.
To have an idea of how many calories are consumed during dancing, a simple calculation can be made; multiplying the caloric cost of the dance x the body weight in kg / the time expressed in hours (h). The dances have differing caloric consumption levels, and this varies between slow dances (3 kcal*kg/h), and more intense dances (6 kcal*kg/h).
Therefore, a Standard couple made up of a 60kg man and a 50kg woman consume while dancing:
Slow Waltz for 15 minutes (without considering breaks):

- man - 3kcal x 60kg / (1h/4) = 45 kcal
- woman - 3kcal x 50kg / (1h/4) = 37,5 kcal

Quickstep for 15 minutes (without considering breaks):

- man – 6kcal x 60kg / (1h/4) = 90 kcal
- woman - 6kcal x 50kg / (1h/4) = 75 kcal

With regards to competition conditions some precautions should be taken:

- *Pre-competition meal*: should occur 3-4 hours before the competition and should be: easily digestible, sufficiently energetic and made mainly of complex carbohydrates; furthermore the hydric intake should be roughly 500-700ml of water 2-3 hours before the competition.
- *During competition rounds*: the most important aspect is that of hydric intake and salt and mineral restitution; therefore, it would be appropriate to consume 200ml every 15 minutes with dissolved salts and minerals. Energy bars or fruit can also be used to restore energy stocks.
- *Post-competition meal*: the goal is to restore the energy consumed during the competition and intaking all nutrients is important: carbohydrates, proteins, vitamins and salts and minerals. Obviously, hydric intake is also important.

Regarding the daily nutritional routine of an athlete, certain rules should be observed:

- Consume meals at fixed times
- Eat slowly
- Varying foods
- Avoid precooked, pre-packaged, and canned food
- Avoid substituting meals regularly with dietary bars
- Favour seasonal foods
- Avoid skipping meals in that the organism, to compensate, will try to consume that which it didn’t receive earlier
- Avoid abolishing certain nutrients (e.g. carbohydrates or fats)
- Avoid reducing drastically the caloric intake and the amount of food; this can provoke, in the long term, important dysfunctions as well as not supplying the body with sufficient energy to perform the required activity

Final Considerations

At the end of this journey through the study of dancesport, it is important to note that since the advent of dancesport-based research, especially scientifically accredited studies such as those referenced in this publication, Team Diablo has worked to broaden its knowledge, developing working protocols that have allowed its athletes to triumph everywhere in the world.
Today, during the continued observation and monitoring of our athletes' performances, especially relating to heart rates under stress and lactate production, certain values are proving to progressively diverge from those stated in "older" research.
Team Diablo has, over time, developed training protocols for physical, technical, and integrated preparation, which have been modified continuously in response to the observations, tests and examinations carried out contemporarily on athletes to remain up to date.
The improvement of the physical and technical quality of these athletes has almost certainly influenced their physiological values in relation to dancers the past, if only considering the evolution of the training method which has become ever more professional and thorough. To this end, research is being conducted, re-examining the "old data" and comparing it to the "new data", searching for proof that the modern Team Diablo training methods have profoundly influenced dancers, deeply mutating their characteristics in order to truly meet the definition of dancesport "athletes".

Nicola Regnoli e Cristina Garon

Paladanze

I N D E X