

JOY Talk No. 8

Prof. dr. Attilio Sacripanti, IJF Academy Foundation

Rarely do knowledge, experience, and generosity converge in one person. We are deeply honoured to welcome **Prof. Dr. Attilio Sacripanti**, 7th DAN judo master, nuclear physicist, educator, and one of the world's most respected voices connecting biomechanics and judo. With over 160 scientific publications, 23 books, and 8 patents, he has devoted his life to understanding movement, and through it, human potential. In this conversation, he shares not only groundbreaking ideas but also a lifetime of insight on how judo connects generations, deepens understanding, and enriches lives.

Beginnings – From Physics to Judo

You started judo at university while studying physics and later specialized in biomechanics. Looking back today, how has that decision shaped your life and scientific career?

I apologize to everyone in advance, but since I am old and have lived a long time, perhaps my answers will be a bit longer than necessary. In fact, the two paths advanced hand in hand and intersected with my work as a nuclear physicist. I worked for the National Committee for Nuclear Energy (CNEN), having won a competitive exam for a single position. Based near the power plants, I calculated the dose to the critical group, based on the intake of local foods. We first studied the transfer of radionuclides into the natural environment, then into food matrices, and finally into humans to calculate the dose. After the power plants closed, my research centre dedicated itself to a wide variety of subjects, and I initiated research with the Italian Judo Federation, the Italian Olympic Committee, and my office, which became ENEA, investigating the calculation of the energy consumption of a judoka in real competition (therefore without wearable equipment). We used a thermal imaging camera, and during that time, I worked with one of the leading experts in sports science, Professor Antonio Dal Monte. The research lasted four years, and we developed an equation that is also included in my book for the Academy. Shortly thereafter, Diadora specifically asked me to develop sports shoes for marathon runners, and once the contract was over, I obtained three of my eight industrial patents. And so, physics and biomechanics met as part of my work at the industrial research organisation to which I belonged.

What was it about judo that immediately captivated you?

To tell the truth, at first, nothing! Judo was a tool for me; I practiced it to relieve the stress of studying. That's how I became a black belt – the first black belt at the University of Naples at the CUS University Sports Centre. There, I won the university championship in 1973, but in the final, I broke my shoulder. This ended my competitive career and marked the beginning of my refereeing career, making me the youngest international referee of the Federation.

Meanwhile, something important happened: a friend of mine, instructor Giuseppe Marmo, a former Italian champion, called to give me an English book that I still keep dearly, *The Secret of Judo* by Avakian and Watanabe. I didn't like the book at all, so I decided to write one myself on the biomechanics of judo, starting from the Neapolitan Alfonso Borelli, the founder of biomechanics (1680), and using real scientific works. I discovered there were none in the West, but then I found a very valuable continuous collection in the *Bulletin of the Association for the Scientific Study on Judo of the Kodokan*, which my dear friend, Master Tommaso Betti Berutto, lent me, as he had the entire library.

This allowed me to write my first book on judo biomechanics. Through the Japanese works, I identified that the displacement motion of the pair on the tatami is of a Brownian type, and I also organised the biomechanical classification of judo techniques, which I presented in Athens in 1987 and shortly afterward found reflected in the American text *Biomechanics of Human Movement* by Adrian & Cooper, 1989... but that is another story.

Thus, judo became an important part of my life because it was not just "simple gymnastics" but a cultural phenomenon to understand. For a physicist, that is true appeal. That's how I began to love judo, a mature and lasting love, with its Eastern cultural charm, but always viewed through a Western cultural lens, because European culture certainly has the same dignity as Eastern culture, and far more points of commonality than one might think.

Science Meets the Tatami – Biomechanics of Judo

How has your scientific research influenced your understanding and practice of judo? Can you recall the first time your research changed the way you approached a technique on the mat?

In every respect, after the biomechanical classification of techniques in 1987, I have always seen judo in a profoundly different way. I remember, for example, a delightful event: in 1989, Minatoya Hiroshi came to Rome as a tourist, and I went to meet him at the hotel to discuss some of my analyses. He was, of course, a well-known world champion, while I was an illustrious unknown. He was very courteous and received me in the hotel lobby, and we began to talk about judo and biomechanics.

When I explained that, from a biomechanical perspective, Tori applies the exact same principle for Uchi-mata and O-soto-gari, and that therefore they are, roughly speaking, the same technique, the only difference being uke's body (face and shoulders), he was shocked and insisted I was wrong. After half an hour of discussion, we shared a cognac and performed several joint demonstrations of Uchi-mata and O-soto-gari in the hall, in civilian clothes. His face lit up as he finally understood the concept. He was so happy that he ran to his room and immediately returned, giving my wife, who had accompanied me, a kite signed by Utamaru, which I still treasure.

Earlier, in 1988, I was a guest at a friend's in Naples (I never opened a personal dojo), and we were always discussing Uchi-mata. He asked me what I thought were the best grips and where to place the leg that sweeps the inside of the thigh. After some discussion, I ventured to give advice based on biomechanics and explained that to save energy, Tori's leg could even sweep the inside of the malleolus by having very high grips. Here a passionate discussion arose on the fact that the Japanese meaning was "inner thigh." I saw the effectiveness, and he saw the tradition. So, I told him that the grips were superfluous for all the couple's techniques. For De-ashi-barai it is easy to understand, but for Uchi-mata it is less obvious (people always forget that we are in a gravitational field), and he told me I was joking. To convince him, I first performed the technique on a young man, and then directly on him while standing. He did not believe it at first, but that demonstration convinced him.

Gensoku no Genkei – Judo for Older Adults

In 2024, your work explored how judo can help older adults prevent falls and maintain mobility, leading to the development of Gensoku no Genkei. Could you explain how this method works?

It is very simple: the Gensoku is a sequence of ten movements inspired by Itsutsu-no-Kata, divided into two series of five. In the first series, Tori applies simple technical actions (forces) on Uke, who must learn how to fall by receiving support to help him in the process (in the spirit of Jita Kyoei). In the second series, Uke applies the same actions on Tori, who learns to defend himself with minimal effort (in the spirit of Seiryoku-Zenyo). From this perspective, it also becomes a practical way of carrying out Kano Sensei's two maxims: [Gensoku No Genkei Official Lesson \(Safe Form\)](#)

How did the idea for Gensoku No Genkei come about?

Certainly, the problem of teaching falls to an elderly person, or to a boy, must necessarily be based on the biomechanically simplest movements a person can perform. But I also wanted to include movement, since in the Dojo we traditionally teach falling from a fixed position, while elderly people often fall while moving. How to solve this problem? Kano Sensei had already shown us at the beginning of judo, by inventing or using Kata (a sequence of prearranged movements to train people). But could I, an illustrious unknown, allow myself to invent a Kata? I remained perplexed by this question, but fortunately Kano Sensei came to help me through a friend of mine, 9th DAN veteran of the first Tokyo Olympics, Sensei Bruno Carmeni, who knows Japanese, which I completely ignore.

From the text I prepared [\(PDF\) Gensoku No Genkei \(原則の原型\) A journey into the simplicity of movement 28 JUNE 2022 PROF. ATTILIO SACRIPANTI VII Dan -IJF Academy EDucating Judo Coaches for Older Practitioners](#)

"If we speak about Karate Kata and Judo Kata, there are very big differences in these two words as ideogram with the same sound. Referring to Karate, the

ideographic part is composed of two main parts, one upper and one lower. Kata of karate, Kata of judo The first part is a common basis of the two interpretations indicating "good", but if we add two other signs it indicates a "rule", a "condemnation", by extension "prisoner of the model", that is a "form closed" which suggests something codified that does not allow a change. The second part refers to the earth, the ground, the gravitational shape, the void, which serves to create the shape of objects. Kata Good closed form Earth By choosing the second ideogram 形, Kanō Jigorō 嘉納治五郎 became the first in the history of the "arts of skill", known in the West with the misleading concept of "martial art", to have adopted this kanji indicating the kata 形. The first ideogram is included in the closed expressions of exasperated repetitiveness. What may seem to a layman, a form of enslaving and almost robotic learning, is for the Japanese expert a method of instruction that allows him to have access to his own intrinsic potential. The second instead used in Judo, open form, brings the Judoka to self-expressive and creative opportunities."

This was the solution: apply a creative opportunity to the Itsutsu no Kata! Why Itsutsu? Because it was short and simple (as movement, not as meaning), making it very suitable as a basis for a new evolution.

Following the Kano-Carmeni episode, another series of Jita Kyoei "miracles" occurred: first, Franco Capelletti, 10th DAN master, asked me to help him with his idea of Itsutsu-no-Kata; then a group of friends and judo masters became passionate about the undertaking (Aliano, Fabi, Ruggeri, Quaglia); and finally, Edward Shiley, 8th DAN from the United States (whom I had met via email), voluntarily asked me to review the English of the text. Thus, I finalized what I wrote in the summary:

"This is the story of a journey in search of the archetype of the simplicity both of movement and use of forces that ended with ten idealized actions, that answer the two questions. Can you please help me fall down? What is the best use of force? Seen in the light of the two maxims of Judo: Jita Kyoei (自他共榮) and Seiryoku Zenyo (精力善用)- Gensoku No Genkei (原則の原型) "The Archetype of the Principle" of the use of forces".

Artificial Intelligence & the Future of Judo

How can AI and non-linear dynamics be applied to judo movements such as Seoi-otoshi (Suwari) and Uchi-mata as archetypes of throws, and what insights can this approach provide for coaching and training across different age groups?

Oh! That's a sneaky question! And, yes, I mentioned it to you, but the work is, in fact, still a work in progress, and you don't ask a painter what he's painting while he's still working. But given your kindness, I'll try to answer you anyway. Judo is a complex system in which everything evolves continuously over time. The study I've addressed and explained in *The Biomechanical Science of Judo*, an IJF Academy Publication, is a simplified model of what actually happens, in which I begin to study and explain

the techniques step by step until I reach competition analysis. This valid model, although it seems complex, has inherent limitations associated with simplification. Obviously, it seems logical to seek to develop a study that analyzes reality in greater depth. This was impossible until now due to two limitations: on the one hand, theoretical tools were being developed, nonlinear dynamics, fractals, and chaos theory; on the other, tools for extracting useful information from videos. Now, with the advent of AI, all this is possible, and I am trying to open up the world of judo to an understanding of its true complexity.

Let me clarify right away that the initial target is the study of high-level competition, the results of which will then allow for updates in the practice of clubs and across different age groups. I will try to explain the concepts in the simplest way possible. Judo, in this new vision, is no longer a set of techniques to be applied, but a process that continuously seeks to provoke the opponent's **instability**, controlling it until ippon. But no longer through simple forces, rather through sophisticated mathematical tools that "exist" in an ideal space called *phase space*, such as attractors, basins of attraction, bifurcations, trajectories produced by sensitivity to initial conditions, etc. Therefore, the macroscopic phases – imbalance, positioning, attack, projection – that we know and study, disappear and are now united in a geometric continuity, in which the Tori-Uke interaction is seen, in a more complex but realistic way, as a continuous, coupled, and self-organizing system that seeks to develop control over the opponent's **instability**. So the concept of **throwing technique** is replaced by a basic model of instability, or "**Archetype of instability**."

The second step was the identification of two **basic archetypes** in known terms, Uchi-mata and Seoi-otoshi in the suwari version, which, in terms of **instability** (according to my intuition, to be tested experimentally), include within them, by changing the degree of instability, all the other throwing techniques. This could be a new dynamic classification of throwing techniques, following Kano's five principles (Te, Ashi, Koshi, Ma, and Yoko Sutemi waza) and the Sacripanti Biomechanical Classification based on two principles (Couple and Lever techniques); the classification would then function according to the **Archetypes of Instability**. In short, it will depend on a single principle only (**Instability dynamics**), which leads Uke's body the basin of attraction of the throw, where Tori applies a torque or a lever to throw Uke. Really speaking, with this new vision, I try to modernize judo without betraying its essence.

How can these insights help coaches better understand movement patterns and support learners of all levels?

For coaches, this new way could be useful because it provides only one operational model: **Instability**. It offers a concrete, fight-related teaching program based on this model and allows coaches to interpret the fight with a single, objective tool. This new vision can create a bridge for athletes between their intuitions and scientific data and measurements, which can be interpreted only with the help of AI. The role of AI in the near future will be as an *Analytical Catalyst*.

Unlike many sports science papers that use AI for simple video recognition, this framework utilizes AI, specifically Deep Learning and HDBSCAN (Hierarchical

Density-Based Spatial Clustering of Applications with Noise), applied over varying values, integrating the results to find a clustering that provides the best stability. For example:

- **Identify "Hidden Topologies"**: Detect patterns in Center of Mass trajectories that are invisible to the human eye.
- **Quantify Instability**: Use Lyapunov Exponents to pinpoint the exact moment of Kuzushi as a phase transition rather than a subjective observation.
- **Automated Clustering**: The system can discover "hybrid" **archetypes of Instability**, suggesting that AI can expand our understanding of technical execution beyond traditional teaching (see *Chaotic Throws* in my IJF Academy book).

In my paper, I will also propose a pedagogical evolution based on a three-level educational program (Awareness, Timing, and Robust Application), which provides a scientific roadmap for developing "Technical Intelligence" in elite athletes, shifting the focus from "learning a move" to "mastering a dynamical state."

AI can also help in injury prevention: by monitoring transitions into high-instability regimes, the system could potentially flag execution patterns that lead to high-risk falls or joint stress before an injury occurs. With this last note, I think my answer is sufficient, before being accused... of judo heresy!

Is there a recent innovation or approach that has particularly excited you?

Yes, one particularly interesting idea comes from the latest scientific contributions in motor skill acquisition, and it is redefining judo training worldwide. This method is called **Ecological Dynamics (ED)**, now considered one of the most advanced theoretical frameworks for oppositional sports. According to ED, the judoka is a complex, self-organizing system, and learning arises from the continuous interaction between athlete, opponent, and environment.

ED is transforming judo coaching by emphasizing adaptation, perception-action coupling, and functional variability. Key points: technical solutions emerge from the context, not from predefined patterns; training must replicate the complexity of combat; and athletes develop resilience and adaptability.

From ED, another important method has emerged: the **Constraints-Led Approach (CLA)**. CLA is an applied methodology based on manipulating task, environmental, and organism constraints to guide learning. It is recognized as one of the most influential models in contemporary judo skill acquisition. Key points: the coach becomes a "constraint designer"; variability is a driver of learning, not a mistake; and technical solutions emerge spontaneously under well-designed constraints.

Traditionally, discussions in judo often focus on National Schools (Japan, Russia, Georgia). These are not scientific theories but cultural and methodological models. Today, however, they are increasingly being reinterpreted in light of ED and CLA.

JOY Project & Intergenerational Exchange

Based on your experience, what do you see as the most important developments or innovations in judo training for practitioners of all ages?

In general, when speaking about training for all ages, the **Project JOY** is one of the most interesting innovations in the judo world. Most heartening is the global success of the project, which is based on four main principles:

- **Longevity:** Judo is now scientifically applied, initially as a protocol for fall prevention in seniors (project [EDJCO](#)). The focus has shifted to *Proprioceptive Judo*, where the mat becomes a safe laboratory for balance, bone density maintenance, and recovery of muscular elasticity.
- **Pedagogical Exchange:** Training sessions are increasingly designed to foster mentorship between veterans and youth, moving away from purely age-segregated classes and encouraging the exchange of life experiences.
- **Active Mind:** Modern training recognizes that the mind tires before the body. This approach develops a “faster” brain, enabling practitioners, for example, to transition between *tachi-waza* and *ne-waza* with near-instantaneous decision-making. These activities are crucial for brain plasticity and help older brains regain elasticity and a sense of “youth.”
- **Democratization:** Finally, these protocols have made judo far more appealing to parents and older beginners who previously feared the physical demands of the sport.

The JOY project connects older and younger generations through judo. In your view, what can each generation truly learn from the other, both on the mat and in everyday life?

In the spirit of judo, exchange is never one-way. Each generation carries a different human “treasure” that enriches the other.

From the most experienced generations to the young

- **Patience and Respect for Timing:** In an age dominated by instantaneity, senior practitioners teach that mastering a *Waza* takes years. They convey the value of patience and perseverance.
- **Energy Economy (Seiryoku Zenyo):** A young person tends to use brute force. The older person, having less muscular power, must necessarily excel in using the opponent's energy, teaching the young person that effectiveness lies in *Kuzushi* and not in muscle (see *Gensoku No Genkei*, second half part).
- **Emotional Resilience:** Elderly people bring to the mat a perspective that puts defeat into perspective, transforming it into a lesson in humility and growth.

From Younger Generations to Seniors

- **Vitality and Playfulness:** Young people bring Judo back to its playful side. For an older person, a child's enthusiasm can rekindle passion and counteract rigidity, not only physical but also mental.
- **Adaptability:** Young people are fluid and ready for change. Interacting with them forces the experienced practitioner to break free from established patterns and constantly rethink themselves.
- **Connection to the Present:** Young people act as a bridge to the contemporary world, helping seniors still feel like an integral part of our rapidly evolving society.

Can you share a moment with either older or younger participants that particularly surprised or inspired you?

I'll share an episode that I saw during a JOY session in the dojo in Rome. A boy, about ten, was helping an elderly participant get up after a balancing act. The older man, with a smile, said to him, "One day you'll be the one who needs a hand." The boy replied, smiling, "*Then I hope there will be someone like me.*"

In that moment, they both understood, and I with them, that they were building something beyond judo: *they were building reciprocity*. It's a simple and short episode, but for me, it was very interesting and captures the essence of the JOY project: *it's not assistance, it's alliance!*

Message to the JOY Community

What would you like participants to take away from the experience and carry with them beyond the mat?

What I hope they carry beyond the mat:

- That judo is a language of relationships, not just a set of techniques: through contact with people of different ages, they learn to listen, respect, and truly cooperate.
- That every Uke and every Tori is a teacher: from older judoka they learn experience and calm; from their peers they learn courage and creativity.
- That the moral code values (respect, friendship, courage, self-control, etc.) make the most sense outside the dojo: at home, at school, and in their future work.

If you could share one piece of advice or encouragement with the young participants in the JOY project, what would it be?

If I could share one piece of advice with the young participants of the JOY project, it would be this: Never underestimate the power of small, consistent steps. In judo, as in life, progress is rarely explosive; it is usually the result of patience, curiosity, and the courage to try again after each unbalance. Every fall teaches you something,

every partner helps you grow, and every moment on the tatami is an opportunity to understand yourself a little better.

Now, the final encouragement. ***Go out into the Word and live like a Judoka!***

*Interview conducted by
Ms. Špela Lampe Cakići (Judo Club Golovec)*