IJF ACADEMY

THE ARTS AND SCIENCES OF JUDO

AN INTERNATIONAL INTERDISCIPLINARY JOURNAL
Vol. 5 No. 2 2025

„The Arts and Sciences of Judo“
Interdisciplinary journal of International Judo Federation

Volume 5, No. 02 2025; ISSN 2788-5208; Indexed in ERIH PLUS, Google Scholar

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Publisher: IJF Academy Foundation (Malta, Ta Xbiex)
Co-publisher: International Judo Federation (IJF)
Layout and front page: Nicolas Messner, IJF Media

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Analysis of Kata Scoring and Performance Patterns at the Elite Level in Judo

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Abstract: *Kata is a critical form of judo which is practised by judoka to gain a better understanding of the principles and intricacies of the techniques they perform, while working harmoniously. Judoka can compete in kata competitions which are scored by a panel of Judges.*

Despite multiple measures to reduce score variability due to the human factor, a component of mystery in the scoring of kata remains. No prior studies exist. This study aims to quantify where the greatest variability in kata scoring exists.

Statistical analysis was performed on publicly available competition records from the 17th European Kata Championships using R version 4.4.2, using packages ggplot and lme4 to perform linear mixed-effects models and estimated marginal means analyses. Šidák-adjusted p-values were used to control for a Type I error in multiple comparisons.

Ju-no-kata showed the lowest variability rates ($\Delta = -0.352$, $d = -0.999$, $p < .001$, Šidák-adjusted $p < .001$) whilst Nage-no-kata had the highest variability rates ($\Delta = 0.160$, $d = 0.452$, $p = .006$, Šidák-adjusted $p = .031$). Nage-no-kata's junior category had greater variable scoring than seniors (Šidák-adjusted $p < .001$). Nage-no-kata's uki-goshi had the highest significant judge variability (Šidák-adjusted $p < .001$).

Ju-no-kata was the most consistently marked kata, whereas Nage-no-kata had the greatest judge variability, with the junior category being scored far less consistently than the seniors. Uki-goshi was the most inconsistently scored technique. Yoko-guruma, sasae-tsuri-komi-ashi and tomoe-nage displayed similar yet less significant trends of inconsistency.

Keywords: *kata; competition; variance; scoring; accuracy*

Kata has been a critical component of judo since its inception by Jigoro Kano Shihan in 1882 (Kano et al., 2013). The *kata* are structured exercises used to teach particular principles of judo and require the co-operation of a pair of *judoka*, namely, *tori* (person applying the technique) and *uke* (recipient of the technique) (Kano & Murata, 2005). The purpose of practising *kata* is for the *judoka* to better understand the principles and intricacies of the techniques they perform within the context of each *kata*, while working harmoniously (Otaki & Draeger). Other than being considered an historic component of judo, the practice of *kata* is still used in contemporary judo with its importance being stressed for the development of *judoka*, especially those who compete in *shiai* (Bradic et al., 2017; Kano & Murata, 2005). The International Judo Federation (IJF) considers this perspective so vital that it has focused on the dissemination of *kata* knowledge worldwide through the '*Kata* For All' programme (IJF, 2024).

Kata competition has grown in popularity to become a focused alternative to *shiai* (competition fighting) for many *judoka*, seeing a worldwide stage for the first time in 2007 with the first international Kodokan *kata* event (Gatling, 2008; Miranda et al., 2010). Striving for mastery of the concepts learned through practising *kata*, pairs of *judoka* can compete in *kata* competitions where technical and synergetic efforts are scored and ranked (IJF, 2023). Although there are schools of thought that consider competition in *kata* to be medal-focused and therefore counter-intuitive to the purpose of *kata* (Jones & Hanon, 2010), the continued technical learning, refinement and synergy of *kata* practice that is required for competition strongly adheres to the very essence of *kata* practice (Kano & Murata, 2005; Otaki & Draeger, 2019; Sato & Inoue, 2024). The benefits of practising *kata* include increases in technical judo skill, mental health, physical conditioning, appreciation of judo culture and tradition through *kata* practice (Kano & Murata, 2005; Murata & Todo, 2007; Otaki & Draeger, 2019). Competing in *kata* events has been shown to take these benefits further with positive influences on the development of self-confidence, self-control, concentration and physical control for *judoka*, especially so among the youth (Bradic et al., 2022).

In the *kata* competition setting, the aim is to gain the highest possible score, which is done by following the rules of *kata* evaluation for their performance. Results of *kata*

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competitions held under the auspices of the European Judo Union (EJU) are made public on their website following the conclusion of the event and may include overall ranking positions, contest sheets, photographs and miscellaneous media (EJU, 2023).

LITERATURE REVIEW

Kata competition rules are interpreted and applied by *kata* judges for each *kata* performance which are then expressed as scores (IJF, 2025). A *kata*'s technical aspects, refinement and synergy are vital in performing a high level *kata* (IJF, 2025). Judges need to assess every *kata* performance according to these principles and award scores that are reflective of the intricate scoring guidelines (IJF, 2020, 2025). It stands to reason that if judges do this effectively, the *judoka* with the best *kata* should always win. The human factor in judging can allow influences such as personal experience, preferences, interpretation and unconscious components to impact the scores assigned by judges (MacMahon & Mildenhall, 2012). This can give rise to variances in scores given by a panel of judges for one or more particular technique(s)in a *kata* performance. This phenomenon is not unique to judo but remains a challenge in many sports where performances are scored based on observation by judges, such as *karate kata* (Clark, 2022), gymnastics (Atiković et al., 2020) and equestrian dressage (Wallenborn & Wolframm, 2011), as opposed to a player-versus-player situation. Judo's unique challenge is that instead of scoring the entire performance according to several criteria, each composite technique within a *kata* is scored separately by the judges, adding to the technical attention required.

The IJF revises its *kata* regulations continuously with annual updates, in the pursuit of making scoring by *kata* judges predictable, reproducible, explainable and in the spirit of fairness to competitors, while removing the component of mystery from scoring (IJF, 2025; Szogedi, 2023). Of the five continental unions, the EJU is lauded as the leader of innovation in regard to the development and implementation of new technologies and systems for *kata* competitions in addition to maintaining exemplary standards of *kata* judge certification and examinations (Szogedi, 2023).

According to the criteria for *kata* evaluation in competition by the IJF (2025), five *kata* are included in modern *kata* competitions, namely, *Nage-no-kata*, *Katame-no-kata*, *Kime-no-kata*, *Kodokan Goshin Jutsu* and *Ju-no-kata*. These *kata* encompass between 15 and 21 techniques each (*kata* dependent) with the addition of 'opening' and 'closing' ceremonies, all as techniques to be scored. A panel of five judges allocates scores per technique for each *kata* based on the IJF criteria. The purpose of the scoring is to identify the pair who present the *kata* that best embodies the principles demonstrated by the specific *kata* performed.

A significant difference in the scoring of the same sports performance by different judges is not only frustrating for the competitors, coaches and the judges themselves but can cast an impression of unprofessionalism within high-level competitive sport (Helsen et al., 2019; MacMahon & Mildenhall, 2012). Efforts have been made to continuously educate *kata* judges, make use of developing technologies in the scoring system, exclude score outliers and increase agreement between judges, in order to reduce the inter-judge variance (IJF, 2025; Szogedi, 2023). While these efforts help, the variance effect remains a concern, with a need for the identification of techniques and situations that carry the most risk of score variance between judges. To date, there have been no studies that focus on identifying where the greatest risk lies for inter-judge variance within judo's competition *kata*.

This study aims to determine patterns of significant variance in the scoring of competition *kata* at the elite level. Results will demonstrate specifically where the greatest lack of consistency in scoring lies. The practical application will be in the further focused education of *kata* judges regarding techniques that carry a high risk of variance. The goal is to achieve a more consistent and fair evaluation process for competition *kata*. Competitors can make valuable use of this information by stratifying their *kata* and clearly demonstrating the principle in question in techniques known to carry a critical risk of variance, decreasing the likelihood of ambiguity in scoring.

METHODS

Competition results from the 17th annual European *Kata* Championships in Rijeka, Croatia, that were published on the official EJU website (EJU, 2023) were analysed. The competition records contained the scores awarded for every *kata* entry, per technique and per each of the five anonymised *kata* judges. The contest sheets are available at https://www.eju.net/event/european-judo-championships-*kata*-rijeka-2022/221461/. Results for all five competition *kata* were collated into datasets for individual *kata* performances as well as for specific *kata* overall and were utilised to calculate further data such as: total, mean, grand mean, minimum, maximum, difference from mean, percentage and categories for *kata* results and judge score variance values (rank scores). Rank scores were defined as the difference between the highest and lowest judge scores and were used to quantify scoring variability, with higher values indicating greater inconsistency among judges. The primary aim was to assess whether variability differed systematically across various *kata*, techniques and participant categories (seniors and juniors). Criteria for a *kata* entry to be included in the study were: *kata* that were performed for the purpose of ranking in the Rijeka EJU *Kata* Championships; *kata* that received scoring and were digitally recorded; *kata* where the full series of sets were attempted (seniors and group 5 junior categories). *Kata* were excluded from the study if: they did not meet the inclusion criteria; *kata* were attempted but ceased before completion.

Statistical analysis was performed in R version 4.4.2 using packages ggplot and lme4 for mixed methods (Bates et

al., 2015; R Team, 2010). All analyses employed linear mixed-effect models with a random intercept for judging pairs to account for differences in baseline scoring tendencies. This modelling structure was selected based on model fit and random effect variance components which are reported per analysis (Bates et al., 2015; Pinheiro & Bates, 2000). Estimated marginal means (EMMs) were computed to compare scoring variability across various *kata*, techniques and participant categories, with contrasts conducted against the grand mean, calculated as the overall average of rank scores across all observations, serving as a reference point for comparisons. Contrasts against the grand mean were prioritised over p-values relative to a reference category (usually presented) to evaluate each group's deviation from the overall average, aligning with the study's focus on systematic variability across all groups.

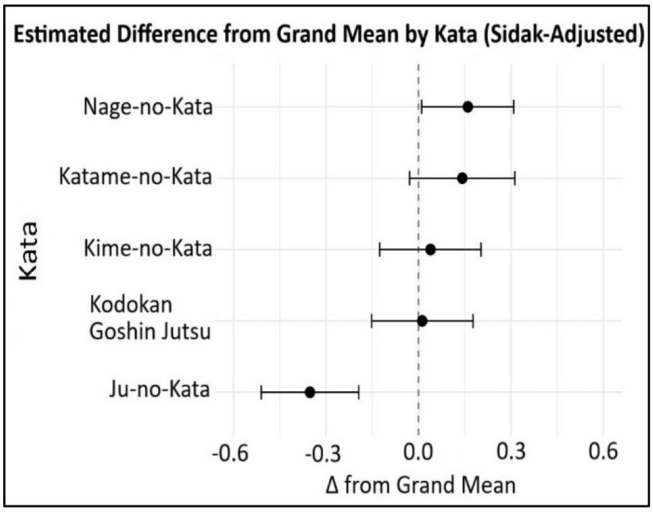
Several statistical measures were utilised to assess the fit and characteristics of the mixed model. The proportion of variance explained by the model's fixed effects was reported as marginal R^2, indicating how much of the variability in rank scores was accounted for by the predictors (*kata*, participant category and technique). The total variance explained, including random effects, was reported as conditional R^2. Variance per population (σ^2) was used to describe the spread of scores attributed to random effects (e.g., judging pairs) and residual variance, with higher values indicating greater variability. Standard deviation (SD), the square root of σ^2, provided a measure of this spread in the same units as the rank scores. Differences in EMMs compared to the grand mean were expressed as Δ, representing the magnitude and direction of deviation in rank scores for a given *kata*, technique or category. Effect sizes were calculated as Cohen's d using a pooled standard deviation combining residual and random intercept variances. All analyses utilised a 95% confidence interval to estimate the precision of the results, with statistical significance accepted at $p < 0.05$. To control for Type I error in multiple comparisons, Šidák-adjusted p-values and confidence intervals were adjusted using the Šidák method, which maintains the familywise error rate while assuming independence among comparisons. (Šidák, 1967).

RESULTS

12855 judges' scores from 2571 techniques across 135 *kata* performances were included in the analysis. A linear mixed-effects model was used to compare rank scores across various *kata* (*Nage-no-kata*, *Kata*me-no-*kata*, *Kime-no-kata*, *Kodokan Goshin Jutsu* and *Ju-no-kata*). The model explained 19.7% of the variance through fixed effects (marginal $R^2 = .197$) and 34.6% overall (conditional $R^2 = .346$). Random intercept variance for pairs was modest ($\sigma^2 = 0.027$, SD = 0.165), while residual variance was higher ($\sigma^2 = 0.120$, SD = 0.346), yielding an intraclass correlation coefficient (ICC) of 0.184.

Comparisons to the grand mean showed that *Ju-no-kata* had significantly lower rank scores (Δ = −0.352, d = −0.999, $p < .001$, Šidák-adjusted $p < .001$), reflecting the most consistent judging. *Nage-no-kata* had significantly higher rank scores (Δ = 0.160, d = 0.452, p = .006, Šidák-adjusted p = .031), with the greatest scoring variability. *Kata*me-no-*kata* showed a similar trend for greater scoring variability (Δ = 0.142, d = 0.402, p = .032), although this was not significant after correction (Šidák-adjusted p = .150). *Kime-no-kata* and *Kodokan Goshin Jutsu* did not differ meaningfully from the grand mean (p = 0.979 and p = 1.000 respectively). These results are represented graphically on an EMM contrast plot, showing the difference from the grand mean, adjusted using the Sidak correction for multiple comparisons. The horizontal error bars represent the confidence intervals around the estimated marginal means (see figure 1).

Figure 1. EMM Contrast Plot for All Competition *Kata*

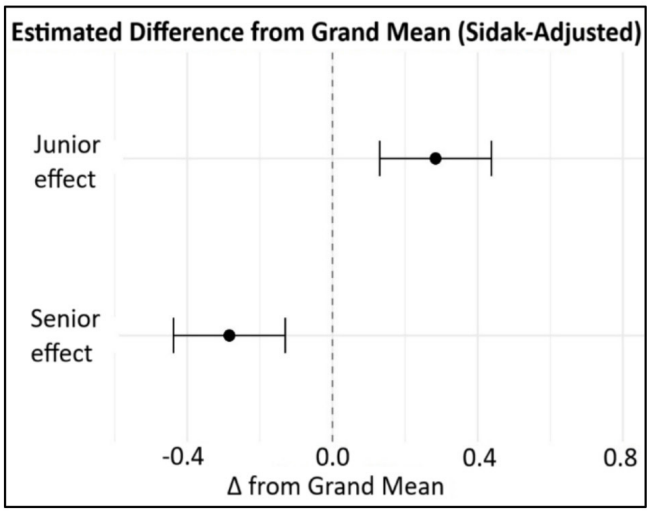


Category Effects Within *Nage-no-Kata*

A second linear mixed-effects model was fitted for *Nage-no-kata* to examine effects of participant category (junior vs. senior) and composite techniques. The model explained 19.4% of the variance via fixed effects (marginal $R^2 = .194$) and 37.7% overall (conditional $R^2 = .377$). The random effect for pairs showed modest variance ($\sigma^2 = 0.112$, SD = 0.345), with larger residual variance ($\sigma^2 = 0.391$, SD = 0.626), resulting in an ICC of 0.224.

Participant category comparisons' EMM's revealed that the juniors had significantly higher rank scores than the grand mean (Δ = 0.284, SE = 0.066, d = 0.454, $p < .001$, Šidák-adjusted $p < .001$), indicating far more variable scoring, while seniors scored significantly below the grand mean (Δ = −0.284, d = −0.454, $p < .001$, Šidák-adjusted $p < .001$), reflecting greater scoring consistency. The adjusted differences effect results for categories (juniors and seniors) within *Nage-no-kata* are represented graphically on an EMM contrast plot (see figure 2).

Figure 1. EMM Contrast Plot for *Nage-no-Kata* Category

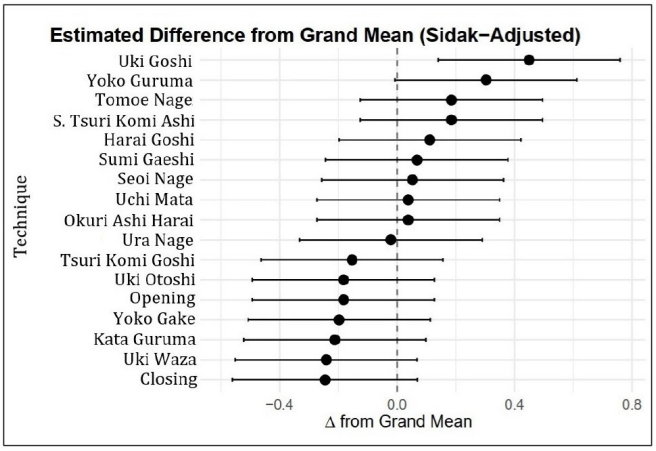


Technique Comparisons Within *Nage-no-Kata*

Comparisons of *Nage-no-kata*'s technique EMMs to the grand mean showed that *uki-goshi* had the highest rate of judge variability (Δ = 0.45, d = 0.719, p < .001, Šidák-adjusted p < .001), therefore exhibiting the greatest significant origin of judge inconsistency in *Nage-no-kata*. *Yoko-guruma* also showed greater scoring inconsistency (Δ = 0.303, d = 0.484, p = .004), although not significant after adjustment (Šidák-adjusted p = .062). Other techniques that demonstrated greater inconsistencies with unadjusted values of p < .05, were *sasae-tsuri-komi-ashi*, *tomoe-nage*, and *sumi-gaeshi* but these did not retain significance after the Šidák-adjusted multiple comparison corrections.

Conversely, several techniques were associated with lower-than-average rank scores, indicating greater consistency among judges. These included closing ceremony (Δ = −0.245, d = −0.392, p = .021, Šidák-adjusted p = .299), *uki-waza* (Δ = −0.241, d = −0.385, p = .021, Šidák-adjusted p = .302) and *kata*-guruma (Δ = −0.212, d = −0.338, p = .042, Šidák-adjusted p = .522). While none of these effects remained statistically significant after correction, they suggest a pattern of greater judge consistency for these techniques. Technique-level variability in rank scores adjusted for multiple comparisons is displayed in Figure 3.

Figure 3. Estimated Marginal Means Contrast Plot: *Nage-no-Kata* Techniques



DISCUSSION

Nage-no-kata is arguably the most well-known and widely practised *kata* in judo worldwide, owing to its performance being required by the Kodokan and many national judo federations for promotion to the rank of *sho dan* (black belt) (Kodokan, 2025). This begs the question as to why *Nage-no-kata* and its *uki-goshi* technique have the greatest judging variability.

Nage-no-kata is the only *kata* in which two techniques (left and right) are allocated one score (IJF, 2025). This has the potential to complicate scoring for the judges, especially if the left and right techniques differ substantially. While this and other scenarios are addressed in the IJF's *kata* evaluation document (IJF, 2025), the potential for difficulty remains.

Uki-goshi is the first technique of the *koshi-waza* (second) set of *Nage-no-kata* (Kano et al., 2013). As *uki-goshi* is a hip-pivoting technique, it does not involve the lifting of *uke* by *tori* by a full insertion of the hip as seen in *o-goshi* (Kano et al., 2013). The action of the fall of *uke* therefore does not appear as grand as the preceding three *te-waza* techniques (Kano et al., 2013) and may be incorrectly interpreted by some judges as incomplete. The angle of approach of *tori* toward *uke* is exceptionally important for correct *kuzushi* or the breaking of balance before the execution of the technique (Kano et al., 2013; Kodokan, 2011). Similarly, correct *kumi-kata* or grip-taking by *tori* on *uke*, first around the back, then followed by gripping on the sleeve with the other hand, is essential for good control (Kano et al., 2013; Kodokan, 2011).

The very technical yet often subtle aspects of *uki-goshi* occur in rapid succession, placing the challenge on the judges not only to be acutely aware of these fine details but also to observe for their presence or absence during a complex movement. A similar trend is seen in *yoko-guruma* where the action-reaction relationship of *uke* bending forward to defend against a *ura-nage* is essential to the realism of the technique (Kodokan, 2011). Tori's subsequent action of sliding the leg through between *uke*'s legs to perform the throw is reliant on *tori* executing the technique at a 45-degree angle, while lying on one shoulder side as opposed to on the back (IJF, 2025; Kano et al., 2013; Kodokan, 2011). This technically detail-heavy movement is also executed rapidly, giving room for a greater margin of inconsistency between judges.

Conversely, *Ju-no-kata* has the greatest inter-judge reliability. This *kata* is known for demonstrating control and is performed at a slow pace in comparison to *Nage-no-kata* (*Fukuda, 2004; Kodokan, 2011*). While very technical in its execution (IJF, 2025), the slower pace intrinsic to *Ju-no-kata* gives the judges more time to watch a technique unfold and observe the critical aspects of judging before making decisions. The timing of this *kata* is owed partially to having no falls, which allows the judges to focus on the actions of

tori and *uke* with fewer movements occurring concurrently (Fukuda, 2004; IJF, 2025).

The high judging variability in *Nage-no-kata* can also be seen within categories of participants. The junior category has far greater inconsistency and judge variability when compared with the seniors. Despite directed training, younger competitors, especially those still in their teenage years, have less refined control and explosivity than their fully mature counterparts (Gantois et al., 2017), which needs to be reflected in the scoring (IJF, 2025). While judging criteria for *Nage-no-kata* are universal and do not differ between age categories (IJF, 2025), there may be potential for judging variance based on the perception of the participants. While judges should view younger participants no differently from their older counterparts, others may view their *kata* performance in relation to the physical capabilities of younger competitors, thus giving rise to inconsistencies.

Judge training can now be further fine-tuned to incorporate attention to the techniques where greater inter-judge variability lies, most notably in *Nage-no-kata*, with *uki-goshi* and yoko-guruma, and other technically detail-heavy techniques that occur rapidly, such as *tomoe-nage* and *sasae-tsuri-komi-ashi*. Other areas of high scoring variability lie in the judging of junior competitors. Exposure to training, updates and frequent judging activity is crucial for those who wish to judge *kata*, especially at a high level.

CONCLUSION

Of all five competition *kata*, *Ju-no-kata* had the lowest variability rate and greatest significant inter-judge accuracy. *Nage-no-kata* had the greatest rate of significant judge variability, with the junior category being scored far less consistently than the seniors. *Uki-goshi* was the most inconsistently scored technique with statistical significance. Yoko-guruma, *sasae-tsuri-komi-ashi*, *tomoe-nage* and *sumi-gaeshi* demonstrated greater judging inconsistencies, while closing ceremony, uki-waza, and *kata*-guruma demonstrated the highest trend of scoring accuracy; however none of these remained statistically significant after adjusted corrections.

While *Nage-no-kata* is often the first *kata* learned by *judoka* worldwide, the consistency of its scoring remains a challenge, even at a continental level. Efforts at reducing inter-judge variability in *Nage-no-kata* through further judge education can be focused on techniques that exhibit higher judge disagreement rates, together with the scoring of juniors and how it differs from that of seniors.

Given the foundational nature of this study in the analysis of *kata* scoring patterns and variability, it is recommended that further studies of this nature be conducted on larger pools of data to make further representative inferences.

REFERENCES

Atiković, A., Kamenjašević, E., Mujanović, A., Užičanin, E., Tabaković, M., & Čurić, M. (2020). Differences

between all-around results in women's artistic gymnastics and ways of minimizing them. *Baltic Journal of Health and Physical Activity, 12*(3). https://doi.org/10.29359/BJHPA.12.3.08

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4.

Journal of statistical software, 67, 1-48. https://doi.org/10.18637/jss.v067.i01

Bradic, S., Callan, M., & Lascau, F. (2022). The Influence of Judo kata excercise on adolescent. *The Arts and Sciences of Judo, 1*(2), 6.

Bradic, S., Callan, M., & Nakamura, I. (2017). Value of nage-no-kata: analysis of motoric movement and principles with the goal of teaching applicability of throwing techniques in simulated combat situations. *4th European Science of Judo Research Symposium & 3rd Scientific and Professional Conference on Judo: Applicable Research in Judo*. Porec, Croatia.

Clark, A. (2022). A Statistical Analysis of the Kata Scoring System in Sport Karate. Ido Movement for Culture. *Journal of Martial Arts Anthropology, 22*(4), 33-40.

EJU (2023). EJU kata results. European Judo Union. https://www.eju.net/event/pordenone-kata-tournament-2023/248112/

Fukuda, K. (2004). *Ju-No-Kata: A Kodokan Textbook*. North Atlantic Books.

Gantois, P., Pinto, V., de Castro, K., João, P., Dantas, P., & Cabral, B. (2017). Skeletal age and explosive

strength in young volleyball players. *Revista Brasileira de Cineantropometria & Desempenho Humano, 19*(3). https://doi.org/10.5007/1980-0037.2017v19n3p331

Gatling, L. (2008). The first Kodokan Judo Kata international competition & its katas [Report]. Journal of Asian Martial Arts, 17(1).

Helsen, W., MacMahon, C., & Spitz, J. (2019). Decision making in match officials and judges. *Anticipation and decision making in sport*. Routledge.

IJF (2020). *Kata competition judges guidelines (Rev 3, 4)*. International Judo Federation.

IJF (2023). *Sports and Organisation Rules (EN 20.03.2023)*. International Judo Federation.

IJF (2024). *Kata for All Project Unveiled (31.10.2024)*. International Judo Federation. https://www.ijf.org/news/show/kata-for-all-project-unveiled

IJF (2025). *Kata competition: Criteria for the evaluation (2025-EN Rev 0)*. International Judo Federation.

Jones, L., & Hanon, M. (2010). The way of kata in Kodokan Judo. *Journal of Asian Martial Arts, 19*(4), 22.

Kano, J., & Murata, N. (2005). Kata Practice (N. Ross, Trans.). *Mind over muscle: Writings from the founder of judo*. Kodansha International.

Kano, J., Yamashita, Y., Isogai, H., Nagaoka, S., Mifune, K., Samura, K.,…Akiyama, S. (2013). *Kodokan Judo: The Essential Guide to Judo by Its Founder Jigoro Kano (K. E. Committee, Ed.)*. Kodansha International.

Kodokan (2011). *Kodokan kata textbooks, Kodokan Judo*. https://kdkjd.org/kodokan-kata-textbook/

Kodokan (2025). *Kodokan dan grading promotion requirements*. Kodokan. https://kdkjd.org/2025/05/24/2025-summer-kodokan-dan-promotion-examination/

MacMahon, C., & Mildenhall, B. (2012). A practical perspective on decision making influences in sports

officiating. *International Journal of Sports Science & Coaching, 7*(1), 153-165. https://doi.org/doi.org/10.1260/1747-9541.7.1.153

Miranda, M., Julio, U., Calmet, M., & Franchini, E. (2010). Práctica y caracterización de las katas por profesores y árbitros de judo experimentados. *Revista de Artes Marciales Asiáticas, 5*(2), 97-110.

Murata, N., & Todo, Y. (2007). Principles of evaluation of Judo kata performance. *Research Journal of Budo, 40*(2), 11-21. https://doi.org/https://doi.org/10.11214/budo1968.40.2_11

Otaki, T., & Draeger, D. F. (2019). *Judo formal techniques: a complete guide to Kodokan Randori no Kata*. Tuttle Publishing.

Pinheiro, J., & Bates, D. (2000). *Mixed-effects models in S and S-PLUS*. Springer science & business media.

R Team, D. C. (2010). *R: A language and environment for statistical computing (Version 4.5.1)*. R Foundation for Statistical Computing, Vienna, Austria.

Sato, Y., & Inoue, S. (2024). Inherent Existence of Kata Learning in Competitive Judo. *Kokushikan Society of Sport Science, 24*, 1-6.

Szogedi, S. (2023). *Grand development goals for the kata judo family*. https://www.eju.net/grand-development-goals-for-the-kata-judo-family/

Wallenborn, A., & Wolframm, I. (2011). *Visual Attention in Dressage Judges* [unpublished master's thesis]. Hogeschool Van Hall Larenstein.

Šidák, Z. (1967). Rectangular confidence regions for the means of multivariate normal distributions. *Journal of the American Statistical Association, 62*(318), 626-633. https://doi.org/https://doi.org/10.1080/01621459.1967.10482935

Article history
Received: 16 May, 2025
Accepted: 02 September, 2025

Developing Virtues in Pre-Scool Children Through The Philosophies of Judo and National Folklore

By Jekaterina Krauze

Abstract: *This article presents an original educational resource — a virtue-orientated activity and colouring book 'Judo for Little Ones: a Colouring Book with Tasks' (Mazajiem par džudo: krāsojamā grāmatiņa ar uzdevumiem) (Krauze, 2020) designed for children aged 4–6. Its purpose is to develop virtues through Jigoro Kano's judo philosophy and Latvian folklore. The resource targets young judo practitioners, their families and educators, focusing on values such as honesty, respect, co-operation, fairness and self-control (IJF, 2023; Nastevičs, 2017).*

The concept is based on an interdisciplinary framework combining developmental psychology, ethnopedagogy, sport philosophy and visual learning. Judo philosophy — emphasising Seiryoku-zenyo (maximum efficient use of energy) and Jita-kyoei (mutual welfare and benefit) — is adapted to preschoolers through playful, exploratory and virtue-centered tasks (Kano, 1925; Bradić, 2023).

The narrative follows three folklore heroes: Tom Thumb (Sprīdītis) (honesty and curiosity), Bearslayer (Lāčplēsis) (strength and mutual support), and Thunderer (Pērkons) (self-regulation and justice). Through their journey, children engage in story-driven challenges involving counting, reading, logical thinking, map orientation, and exploration of Japanese culture and judo philosophy (Fernández González, 2019; Putri et al., 2024).

The tasks are short, imaginative and discussion-orientated, encouraging reflection on virtues without requiring physical activity. The book can be used at home, in kindergartens or during judo classes as a supplementary tool. Its cultural adaptability allows it to support programmes that cultivate empathy and reflective behaviour through meaningful imagery and symbolic action (Alonge, 2024).

Keywords*: preschool children; judo philosophy; virtues development; folklore heroes; educational colouring book; national identity*

Contemporary challenges in education highlight the urgent need for early virtue development in children. Preschool years represent a critical period when value orientations, behavioural patterns and emotional perceptions are formed. At this stage, children are highly receptive to symbolic imagery, creating opportunities to cultivate virtues such as honesty, respect, self-control, and co-operation. Within this context, Jigoro Kano's philosophy of judo holds particular significance as a system that integrates physical, virtue and social development.

Judo philosophy transcends sport. As Kano stated, it nurtures body, mind and spirit in service to society. Its core principles — *Seiryoku-zenyo* (maximum efficient use of energy) and *Jita-kyoei* (mutual welfare and benefit) — represent not only athletic tactics but also a life philosophy centered on respect, mutual assistance and harmony. Scholars confirm that these values can be transmitted to children effectively from an early age when suitable pedagogical tools are applied (Hansen, 2019; Adriana & Mircea, 2011).

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While extensive literature exists on judo instruction for school-age children, resources for preschoolers are scarce. Few materials integrate virtue-based education with playful and cognitive activities. Existing methods emphasise physical exercises and games but rarely address ethical reflection. As Līduma (2014) notes, preschool learning requires imagination, storytelling and imagery.

Here folklore becomes a natural medium for transmitting virtues. Latvian traditions, like many national cultures, present archetypal heroes embodying bravery, honesty, justice and patience. Figures such as Tom Thumb, Bearslayer and Thunderer offer children meaningful role models.

The author's colouring book for ages 4–6 combines judo philosophy with folkloric imagery. Through the adventures of three young heroes, children engage in tasks in mathematics, reading, geography and logic, framed within situations that foster co-operation, decision-making, conflict resolution and emotional awareness. Virtues are conveyed naturally through play and narrative rather than moralising.

The book is not a substitute for judo training but complements it. It can be used independently at home while also

supporting brief reflections during classes, reinforcing the view of the judo club as a place for both physical and virtue growth. The structure is adaptable: characters may be replaced with heroes from other national folklore traditions, making the resource culturally flexible.

In today's world of empathy deficits, rising aggression and weakened social ties, cultivating virtues from an early age is essential. Judo philosophy provides a foundation for humane personality development, while folklore offers an accessible and culturally resonant medium for transmitting these values.

CONCEPT AND DEVELOPMENT OF THE COLOURING BOOK

This colouring book fosters virtues in preschool children by combining judo philosophy with national folklore figures within an interdisciplinary framework of developmental psychology, ethnopedagogy, sports philosophy and visual learning. The aim is to nurture the cognitive, emotional and virtue growth of children aged 4–6, a critical stage for shaping fundamental values.

Psychological foundations emphasise play and visual activities as primary ways young children explore and understand the world (Campagnaro, 2021). The colouring format, enriched with tasks, links fine motor skills, attention and creativity with reflection of virtue themes.

The ethnopedagogical element is expressed through Latvian folklore characters — Tom Thumb, Bearslayer and Thunderer — adapted to the preschool level. These cultural symbols foster identity, belonging and stable internalisation of values (Fernández González, 2019).

Judo philosophy, formulated by Jigoro Kano, underpins the book's structure. Its core principles, *Jita-kyoei* (mutual prosperity) and *Seiryoku-zenyo* (maximum efficiency), are embedded in playful tasks that encourage co-operation, self-control and ethical decision-making (Kano, 2014; IJF, 2023).

Research shows that virtue education is most effective when integrated with daily life through play, storytelling and collaboration with trusted adults. Accordingly, the book is designed for informal use — at home with parents or in short reflective sessions with a judo coach — encouraging natural absorption of values through discussion and role-play (Gasser et al., 2022; Birhan et al., 2021). The family remains central in shaping fundamental virtues, and shared engagement with the book strengthens bonds between child and adult. Coaches can also use it to reinforce values such as respect, self-control and co-operation, thus complementing training and supporting holistic development (Kano, 2014; Līduma, 2014a).

The visual design sustains attention and deepens engagement. Illustrations act not only as aesthetic elements but also as pedagogical tools, enabling children to grasp content, follow narratives and connect emotionally with virtue-orientated scenarios (Häikiö, 2020). A variety of activities — colouring, drawing, logic puzzles, early reading — support holistic development.

In summary, the colouring book integrates effective early childhood education, cultural heritage and sport ethics to cultivate lasting virtuous attitudes. It demonstrates how tradition and modern pedagogy can be combined, opening avenues for interdisciplinary approaches to virtue and physical education in preschoolers (Fousteri & Foti, 2024).

TARGET AUDIENCE

The book is intended for children aged 4 and above; a critical stage in early preschool development marked by rapid growth in imagination, virtue orientation and cognitive abilities. At this age, foundational emotional and social skills emerge, laying the groundwork for future personal growth. Children begin to grasp concepts such as fairness, friendship, honesty and responsibility actively, making them especially receptive to educational influences aimed at cultivating virtues.

The family remains the primary social environment for establishing virtues, and shared engagement with the book strengthens the emotional bond between child and adult (Līduma, 2014a). A judo coach can also use the resource to reinforce values such as mutual respect, self-control and co-operation, thereby complementing training and supporting holistic development (Kano, 2014).

Thus, the chosen target audience and interaction format effectively combine theoretical and practical dimensions of education, maximising the preschool period's potential for cultivating enduring virtues and social-emotional competencies.

RATIONALE FOR CHOOSING THE CHARACTERS

The book 'Judo for Little Ones: A Colouring Book with Tasks' introduces three heroes from Latvian folklore — Tom Thumb, Bearslayer, and Thunderer — who are reimagined as children close in age and perception to the target audience of 4–6 years of age. Presenting these characters as peers fosters emotional closeness and increases engagement, and helps young readers internalise the virtues illustrated in the stories and tasks. At this stage of development, children are particularly responsive to symbolic figures with whom they can identify, making folklore-based characters especially effective carriers of values.

Each hero represents distinct virtues that resonate with both cultural traditions and judo philosophy:

- **Tom Thumb** embodies honesty and curiosity. Despite his small size, he demonstrates resourcefulness and a love of discovery, helping children appreciate truth-

fulness and openness to new experiences. His character echoes the judo principle of lifelong self-improvement.

- **Bearslayer** symbolises strength, support and co-operation. Known for protecting his people, he highlights responsibility toward others and the importance of mutual assistance, directly reflecting *Jita-kyoei* (mutual prosperity).

- **Thunderer**, associated with natural power, personifies self-control, justice and inner strength. He illustrates how emotions can be mastered and energy directed towards fairness and harmony, in line with *Seiryoku-zenyo* (maximum efficiency with inner balance).

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BOOK STRUCTURE

The book 'Judo for Little Ones: A Colouring Book with Tasks' spans 80 pages, uniting narrative episodes with interactive exercises. Each chapter is a mini-adventure in which the heroes travel from their homeland to Japan, encountering cultural challenges that require co-operation, honesty and self-control. These stories not only encourage logical and creative thinking but also show how virtues can be applied in everyday life.

Tasks are diverse and age-appropriate:

- logical puzzles to develop reasoning;
- basic mathematics to strengthen numeracy;
- handwriting and syllable practice for literacy readiness;
- short texts to build reading fluency;
- rebuses and riddles to spark imagination;
- geographical activities with maps and routes to broaden horizons;
- artistic exercises, such as drawing, colouring, and design, to refine fine motor skills and creativity.

Many tasks integrate explicit virtue choices. For instance, children may colour a scene where a hero returns a lost item and then discuss why honesty matters. In another activity, they guide the heroes out of a 'help maze,' where only teamwork and fairness lead to success. Such elements ensure that virtue reflection is embedded within play naturally.

Ultimately, the book supports cognitive, social and ethical development in unity, aligning with contemporary preschool standards and Kano's vision of holistic education.

VISUAL STYLE AND ARTISTIC DESIGN

The artistic concept is deliberately child-friendly; clear contours, gentle forms and a bright yet balanced colour palette create an inviting atmosphere. The author adapted and unified illustrations from open repositories, redesigning characters as children close in age to the target audience. This choice strengthens identification with the protagonists and makes virtues more relatable.

The design draws inspiration from European and Japanese colouring books but retains a distinct cultural identity. Experts in visual pedagogy stress that preschoolers learn primarily through imagery; therefore, vivid illustrations not only attract attention but also help children connect emotionally with the storyline and tasks. In this way, the visual environment becomes a pedagogical tool in its own right, deepening the impact of the book's educational content (Campagnaro, 2021).

INTEGRATION OF JUDO PHILOSOPHY

At the core of each task in 'Judo for Little Ones: A Colouring Book with Tasks' lie the key virtues of judo philosophy, transforming learning into an experience that is at once cognitive, social and virtuous. Jigoro Kano envisioned judo not merely as a physical discipline but as a way of life rooted in the ideals of personal growth and service to society. By adapting these ideas for preschool education, the book introduces children to values that reach beyond sport and extend into everyday decision-making and interpersonal relations.

The heroes of the book model the principle of *Jita-kyoei* (mutual prosperity) by supporting and encouraging one another instead of competing for dominance. Their co-operative interactions demonstrate to children that success is not about defeating others but about helping each other progress. Such portrayals counteract the prevailing culture of rivalry and instead nurture solidarity, empathy and respect. Research confirms that when young learners are exposed to models of prosocial behavior in stories and play, they are more likely to transfer these patterns into peer interactions (Hansen, 2019).

Equally important is the integration of *Seiryoku-zenyo* (maximum efficiency with minimum effort). In playful tasks, children learn that effort should not be wasted on impulsive or destructive actions, but should be directed thoughtfully and purposefully. For example, mazes, puzzles or role-play activities require them to stay calm, concentrate and use their energy rationally. In this way, virtues such as self-control, prudence and inner balance are embedded in the activity itself rather than imposed externally. This experiential approach makes values tangible and memorable.

Another key contribution of the book is teaching children how to navigate socially challenging, conflict situations. Together with the heroes, children explore why disagreements emerge, what emotions they provoke and how fair and respectful solutions can be found. These scenarios provide early training in empathy and constructive communication, abilities that are critical not only for sport but for later life in school, family and community contexts (Johnson et al., 2022). The book thus becomes a tool for strengthening soft skills that modern educational frameworks increasingly recognise as essential for 21st-century learners.

Beyond conflict resolution, the tasks also promote emotional literacy. Children are guided to notice and articulate their own feelings rather than suppress them. Through dialogue and colouring activities, they practise expressing honesty, respect and fairness in concrete situations. This process strengthens emotional intelligence, which has been shown to correlate with resilience, academic readiness and long-term social adjustment (Krauze et al., 2024). By situating emotions within virtue-based contexts, the book helps preschoolers build healthy patterns of self-awareness and self-expression.

The integration of judo philosophy also serves a broader pedagogical function, linking physical, cognitive and virtue development into a coherent whole. When a child colours, solves a puzzle or follows a narrative, they are simultaneously practising fine motor skills, logical reasoning and ethical reflection. This alignment mirrors the holistic nature of Kano's vision, where physical training and virtue education were inseparable. Contemporary educators advocate for exactly such interdisciplinary models, where competencies are cultivated not in isolation but in synergy (Bradić, 2023).

In this way, the book creates more than just a playful learning resource; it offers a comprehensive developmental environment where virtues are experienced, practised and emotionally internalised. By embedding judo principles in familiar preschool activities, the project contributes to raising children who are not only prepared for school cognitively but are also socially competent, emotionally balanced and morally grounded. Ultimately, this approach fosters the emergence of a harmonious personality capable of responsible and conscious participation in society; the very outcome envisioned by Jigoro Kano over a century ago.

REFLECTION AS AN EDUCATIONAL BRIDGE BETWEEN HOME AND THE JUDO DOJO

Reflection on the content of 'Judo for Little Ones: A Colouring Book with Tasks' takes place during short yet purposeful conversations in judo training sessions. After completing tasks at home, such as solving a puzzle, reading a short story or colouring a scene with a virtue choice, children share with the coach what impressed them most: why honesty matters, how it feels to help a friend, or what it means to control emotions. The coach may ask questions like "*What would you have done?*" or "*Which character are you most like?*", creating a mini-dialogue that transfers educational value from family leisure into the dojo context.

Such reflections last only 3 to 5 minutes and fit naturally at the beginning or end of a session. Research shows that even brief pedagogical dialogues with a significant adult (coach, teacher) help children consolidate virtues and begin applying them in daily life (Häikiö, 2020; Līduma, 2014b). They also allow coaches to understand children's inner worlds better, build trust and cultivate orientations consistent with judo philosophy.

THEORITICAL AND PEDAGOGICAL FOUNDATIONS

The development of the colouring book is grounded in both classical pedagogical theories and contemporary research on preschool education, virtues development and visual pedagogy. The central premise is that virtues education, introduced early, has a long-term impact on personality formation and social responsibility. Engaging children through stories, illustrations and tasks not only clarifies concepts but also builds an emotional connection that fosters internalisation (Birhan et al., 2021).

Lev Vygotsky's (2012) cultural-historical theory forms a cornerstone of the project, emphasising that children develop by internalising cultural forms of activity within a social environment. Adults and peers act as mediators of cultural values, while symbols such as fairy tales, heroes and images serve as carriers of meaning. Therefore, folklore provides children with familiar narratives through which they can understand the consequences of actions and appreciate virtues. This aligns with narrative pedagogy approaches (Putri et al., 2024) and Latvian scholarship, stressing the formative role of folk imagery in empathy and identity development (Nastevičs, 2017).

The book also draws on Lawrence Kohlberg's (1981) theory of moral development, according to which preschoolers operate at the pre-conventional level, judging actions mainly by external consequences. At this stage, clear and concrete examples are essential. National folklore heroes meet this need, offering accessible behavioural models within culturally familiar contexts, thereby supporting the shift from rule memorisation to internalised understanding of virtues.

Contemporary studies emphasise that an education of virtues must be experiential. Children acquire empathy and virtue reasoning not through abstract instruction but by living through situations with characters. Tasks in the book stimulate such emotional engagement: children colour, read and solve problems alongside heroes who face dilemmas of honesty, co-operation or emotional control. This enhances the effective dimension of morality, which is a prerequisite for forming stable virtues (Denham et al., 2022).

The activities also target social intelligence — the ability to recognise emotions, regulate them, and act kindly.

Through play, puzzles and storylines involving co-operation and conflict resolution, children practise these competencies in parallel with cognitive skills. Thus, socio-emotional growth proceeds hand in hand with intellectual development, meeting modern requirements for holistic early education.

As Līduma (2014a) emphasises, virtue education in preschool requires a focus on emotional regulation and the cultivation of self-discipline. These principles resonate with judo philosophy, which also highlights the importance of self-control and responsible behaviour. In the book, Thunderer embodies self-control, teaching children the value of calmness and prudence, essential elements of *Seiryoku-zenyo* (Kano, 2014).

The integration of modern theories of virtue education, emotional development, national cultural imagery, and judo philosophy ensures that the book fosters not only virtues but also the socio-emotional competencies required for successful socialisation and later academic and athletic achievement. This comprehensive approach confirms findings by Johnson et al.(2022), who show that education around values is most effective when it unites cognitive and emotional components.

Thus, 'Judo for Little Ones: A Colouring Book with Tasks' exemplifies a pedagogical model in which folklore, visual pedagogy and sport philosophy converge to promote holistic development. It can serve as a prototype for future initiatives in early childhood education, bridging family, culture and sport in a unified process of virtue cultivation (Krauze et al., 2024).

WHY IS A COLOURING BOOK WITH TASKS AN EFFECTIVE FORMAT?

The format of 'Judo for Little Ones: A Colouring Book with Tasks' functions as an effective interdisciplinary tool for preschool education. Research shows that combining colouring with structured tasks enhances attention, improves visual-motor co-ordination and stimulates emotional understanding of behaviour. By embedding narrative choices and virtue dilemmas, the book not only supports visual information processing but also encourages reflective thinking about ethical values.

Integrating visual and meaningful content increases engagement and fosters children's ability to evaluate their own behaviour and adopt social norms consciously. This is especially relevant for ages 4–6, when virtue reasoning is shaped primarily through imagination and play.

Furthermore, the colouring book provides a psychologically safe environment for discussing emotions, conflict and social situations. Visual imagery enables children to project their own experiences, converse about them with adults and develop the capacity to consider alternative perspectives. As Narvaez (2022, 2023) emphasises, virtues education is most effective when children learn in psychologically safe and emotionally supportive environments, while Montessori (2023) highlights the natural process of exploration and self-expression.

Thus, a colouring book combined with educational tasks represents an effective method for integrating play, learning and the cultivation of virtues within a single cohesive format.

THE CONNECTION BETWEEN FOLKLORE AND THE PHILOSOPHY OF JUDO

Folklore characters adapted for preschoolers serve as cultural mediators of Jigoro Kano's philosophy of judo, grounded in *Jita-kyoei* (mutual welfare) and *Seiryoku-zenyo* (maximum efficiency). These principles are reflected in the behaviour of the book's heroes, who resolve conflict, co-operate, and respect both peers and the vulnerable.

- For instance, Bearslayer symbolises strength directed toward the common good. In Latvian folklore, he is a hero endowed with extraordinary physical power and courage but uses his abilities to protect the weak and fight injustice. In the image of young Bearslayer, children learn that strength is not aggression but responsibility and protection, an idea consistent with the philosophy of judo, in which physical power must always be subordinate to virtues and principles, aimed at constructive purposes (Kano, 2014; Krauze et al., 2024). Thus, Bearslayer helps children internalise the virtues of friendship and mutual support, fostering empathy and a willingness to assist others.

- Tom Thumb embodies resourcefulness, honesty and justice. In folklore, he is known for his cleverness and the ability to navigate difficult situations, as well as for faithfully committing to his promises and duties. Through the image of young Tom Thumb, children learn the importance of honest communication, adherence to rules and fair treatment of others. This resonates with one of judo's core values, *Jita-Kyoei* (shared prosperity), for which honesty and openness form the foundation for mutual respect and harmony within a community (Kano, 2014). Tom Thumb teaches children that virtues and principles outweigh immediate gain.

- Thunderer (Pērkons) represents emotional self-control, inner strength and the ability to remain calm even in the most stressful situations. In mythology, Thunderer is the god of thunder and justice, whose power is not expressed through reckless anger but through wise and deliberate applications of strength to restore order. In the portrayal of young Thunderer, children learn to regulate their emotions, manage anger and fear, and recognise strength through calmness and mindfulness. This is directly related to judo's *Seiryoku-zenyo* principle, which emphasises maximum efficiency and rationality, not only in physical movements but also in emotional self-regulation. Through Thunderer, children understand that true strength is not only physical might but also mastery over oneself.

Therefore, each of the three characters (Tom Thumb, Bearslayer and Thunderer) not only reflects distinct national images but also embodies fundamental virtues: friendship and mutual aid, honesty and justice, self-control and inner strength. These virtues are integrated with the structure of the book through playful tasks and narratives, facilitating their assimilation by children from the age of four. The integration of judo philosophy through folklore characters not only strengthens cultural identity but also opens a pathway to universal values such as respect, kindness and participation. Early childhood is a crucial period when ethical thinking is formed through storytelling and play (Abuo, 2024; González et al., 2021).

Relevance and Scientific Novelty

The use of colouring books as a tool for virtues education in preschool remains insufficiently explored, particularly regarding the integration of Eastern martial arts philosophy and national folklore. In the context of contemporary early childhood education, there is a clear demand for formats that correspond to children's developmental needs and also foster virtue growth within today's visually orientated culture (Montessori, 2023).

Research indicates that the period between ages 4 and 6 is especially sensitive for virtues development, as children begin to grasp social norms and expectations consciously (Berk, 2021). Yet, traditional methods of values education often remain too abstract for this age group. Integrating Jigoro Kano's judo principles (*Jita-kyoei* and Seiryoku-zenyo) into playful, image-rich narratives featuring folklore characters makes these concepts concrete, emotionally meaningful and easier to remember (Kano, 1925; Kano, 2014).

The originality of this material lies in its interdisciplinary synthesis of sport philosophy, Latvian ethnopedagogy, illustrated literature, and value-orientated tasks. Instead of direct instruction, children engage in playful reflection, symbolic actions and narrative-based choices. Such indirect methods align with contemporary research, showing that values education in early childhood is most effective when embedded in experiential, imaginative contexts (Gülseven et al., 2023).

By uniting folklore, judo philosophy and visual pedagogy in a single resource, the project not only addresses a gap in educational practice but also offers a replicable model for integrating cultural and philosophical traditions into modern early childhood education.

DISCUSSION

The colouring book 'Judo for Little Ones: a Colouring Book with Tasks,' which integrates national folklore heroes with the philosophy of judo, represents an innovative approach to nurturing virtues in preschool children. This format is playful, accessible and emotionally engaging, significantly enhancing the internalisation of complex concepts such as friendship, honesty and self-control (Johnson et al., 2022). Rather than perceiving the activity as mandatory learning, children engage through creativity and identification with the characters, fostering a deeper and more lasting development of virtuous qualities (Līduma, 2014b).

The playful and visual format aligns with contemporary pedagogical principles rooted in Vygotsky's (2012) zone of proximal development and constructivist learning theories (Montessori, 2023). Children reflect actively and experience virtues situations emotionally through familiar folklore characters, supporting the development of both cognitive and emotional domains. Age-adapted national heroes also provide a strong cultural foundation, reinforcing identity and respect for heritage.

Within the context of judo philosophy, where *Jita-kyoei* (mutual prosperity) and *Seiryoku-zenyo* (maximum efficiency) are central, this format fosters co-operation, fairness and emotional self-regulation from an early age (Kano, 2014; Gülseven et al., 2023). The book is designed for informal use in the family environment, encouraging collaborative reflection and dialogue, while brief discussions with a coach can help consolidate learning and support the transfer of values into everyday behaviour (Johnson et al., 2022).

In preparatory programmes for young judo practitioners, such a resource can complement physical training by embedding ethical and social dimensions into sport education. This contributes to a holistic model where physical competence, character formation and social responsibility develop in parallel.

The potential for translation and adaptation into other languages and cultures is broad. Since the structure is based on universal virtues and flexible folklore figures, the material can be localised without losing its pedagogical essence. Such adaptability promotes intercultural understanding, tolerance and openness from an early age, aligning with global education initiatives (Zalli, 2024).

Future development may include additional modules, such as elements of the judo moral code, empathy-building activities or interactive family projects. Technological extensions such as multimedia versions with animation and audio could further enhance accessibility and engagement for diverse learning styles (Johnson et al., 2022).

In conclusion, the colouring book is a promising tool for virtues education that combines cultural heritage, modern pedagogy and the philosophical principles of judo. Its innovative synthesis also opens perspectives for interdisciplinary research and practical applications in early childhood education. By fostering foundation virtues, it contributes to harmonious personality development and successful social adaptation in children.

CONCLUSION

The development and implementation of the colouring book 'Judo for Little Ones: a Colouring Book with Tasks,' based on the philosophy of judo and national folklore, represents a significant step toward comprehensive virtues education for preschool children. This approach is important not only for early childhood education but also for fostering sport culture and preserving national identity. Cultivating virtues from an early age forms a foundation upon which both a successful personality and a responsible society are built (Fernández González, 2019; Johnson et al., 2022).

By integrating play, creativity and family involvement, the book supports the development of honesty, friendship, respect and self-control, while strengthening children's cultural identity and emotional attachment to values. For sport pedagogy, it complements physical practice by embodying Jigoro Kano's principles of *Jita-kyoei* (mutual welfare and benefit) and *Seiryoku-zenyo* (maximum efficiency with minimum effort), thereby promoting not only physical but also moral and social growth (Bradić, 2023; Kano, 2014). In the family setting, it encourages intergenerational dialogue, which research identifies as a key factor in effective virtues education (Denham et al., 2022). Brief reflections with a coach can further consolidate learning and assist children in applying virtues in everyday life.

Although the present book draws on Latvian folklore, the structure is interculturally adaptable. For example, in Japan, Momotaro (Peach Boy) illustrates communal responsibility, Kintaro (Golden Boy) represents honesty and curiosity, and Susanoo embodies emotional control and the wise use of strength. In Nordic traditions, figures such as Thor or Baldur can be used to highlight courage and fairness. These parallels confirm that the proposed model can be applied flexibly in different cultural contexts while preserving the philosophical foundation of judo.

The prospects for expanding this initiative are extensive. Didactic materials can be developed to support educators and parents, while digital technologies offer opportunities to enrich the book with animation, interactive tasks and audio, making learning more engaging and accessible for diverse learning styles. Moreover, the structure allows adaptation across cultures and languages by incorporating relevant national heroes, thus enhancing universality and promoting ethical education worldwide (Nastevičs, 2017). In this context, judo philosophy serves as a universal, cultural code that unites traditions and fosters mutual understanding.

Further empirical research is essential to assess and refine the methodology, including both quantitative and qualitative approaches. Feedback from educators, parents and children will help tailor the content to contemporary needs and maximise its pedagogical effectiveness.

In conclusion, the colouring book 'Judo for Little Ones: a Colouring Book with Tasks' is more than an educational resource; it is a meaningful instrument for cultivating virtues in preschool children. By linking cultural heritage with modern pedagogy and sport philosophy, it contributes to the formation of a conscious, responsible and empathetic generation, prepared for life in a culturally diverse and interconnected world (Nastevičs, 2017; Johnson et al., 2022).

REFERENCES

Abuo, A. H. (2024). Nurturing empathy and values through stories while using the didactic potential of children's literature. *Acta et commentationes (Ştiinţe ale Educaţiei), 38*(4), 145-155.

Adriana, N., & Mircea, I. E. (2011). THE EMOTIONAL EDUCATION OF PRESCHOOLERS THROUGH JUDO. *Annals of the University Dunarea de Jos of Galati: Fascicle XV: Physical Education & Sport Management*, (1).

Alonge, M. (2024). The Role of Multicultural Children's Books in Fostering Empathy and Understanding Across Diverse Cultures. *Journal of Professional Services Marketing*.

Berk, L. E. (2021). *Development Through the Lifespan (8th ed.)*. Pearson.

Birhan, W., Shiferaw, G., Amsalu, A., Tamiru, M., & Tiruye, H. (2021). Exploring the context of teaching character education to children in preprimary and primary schools. *Social Sciences & Humanities Open, 4*(1), 100171.

Bradić, S. (2023). *Judo as a method of moral and psychological development* [Doctoral dissertation, University of Hertfordshire]. University of Hertfordshire.

Campagnaro, M. (2021). Picturebooks and aesthetic literacy in early childhood education. *Exploring challenging picturebooks in education*. Routledge.

Denham, S. A., Mortari, L., & Silva, R. (2022). Preschool teachers' emotion socialization and child social-emotional behavior in two countries. *Early Education and Development, 33*(5), 806-831.

Fernández González, M. J. (2019). *Cultural and historical research on character and virtue education in Latvia in an international perspective*. University of Latvia, Rīga, Latvia.

Fousteri, M., & Foti, P. (2024). A creative approach of the differentiated teaching and project method in early childhood education. *European Journal of Education and Pedagogy, 5*(2), 64-73.

Gasser, L., Dammert, Y., & Murphy, P. K. (2022). How do children socially learn from narrative fiction: Getting the lesson, simulating social worlds, or dialogic inquiry?. *Educational Psychology Review, 34*(3), 1445-1475.

González, M. J. F., Balandīna, B., & Kovaļevska, L. (2021). Virtue education programme e-TAP: Innovativeness and thematic fit in the context of preschool and primary education in Latvia. *Human, technologies and quality of education, 530, 5*(1), 142-160.

Gülseven, Z., Yu, M. V. B., Zarrett, N., Vandell, D. L., & Simpkins, S. D. (2023). Self-control and cooperation in childhood as antecedents of less moral disengagement in adolescence. *Development and Psychopathology, 35*(1), 290-300.

Häikiö, T. K. (2020). Aesthetic learning processes in early childhood and early years education: Reflections on educating for sustainable development and use of visual tools and materials. *Techne serien-Forskning i slöjdpedagogik och slöjdvetenskap, 27*(2), 15-30.

Hansen, D. T. (Ed.). (2019). *Ethical visions of education: Philosophies in practice*. Teachers College Press.

IJF (2023). *Judo education guidelines*. International Judo Federation.

Johnson, K., Brown, M., McGrath, R. E., Berkowitz, M. W., & Bier, M. (2022). A Meta-Analysis of the What Works in Character Education Research. *Journal of Character Education, 18*(1).

Kano, J. (1925). Why it is necessary to advocate the principles of Seiryoku-Zenyo and Jita-Kyoei. *Sakko*, 4, 1.

Kano, J. (2014). La mente prima dei muscoli: Gli scritti del fondatore del Judo. *Edizioni Mediterranee*, 144.

Kohlberg, L. (1981). *The philosophy of moral development: Moral stages and the idea of justice*. Harper & Row, New York.

Krauze, J. (2020). *Mazajiem par džudo : krāsojamā grāmatiņa ar uzdevumiem (no 4 gadiem)* –Rīga: ArkuZ.

Krauze, J., Bula-Biteniece, I., & Ābele, A. (2024, May). Actualization of Jigoro Kano's judo philosophy for virtue education in preschool children. In Society. Integration. *Education. Proceedings of the International Scientific Conference, Vol. 2*, 27-36.

Liduma, A. (2014a). Citizenship promotion opportunities: reflections on the Comenius Project 'Me and My Europe: Intercultural Challenges of Modern Pre-primary Education'. *In Innovative Practice and Research Trends in Identity, Citizenship and Education: Selected papers from the 16th Conference of the CICE Academic Network, London*: CiCe, 280-285.

Līduma, A. (2014b). Pedagogical psychological correlations of potentials and abilities. In SOCIETY. INTEGRATION. EDUCATION. *Proceedings of the International Scientific Conference, vol. 1*, 570-580.

Montessori, M. (2023). *The Montessori elementary material*. Otbebookpublishing.

Narvaez, D. (2023). Wellness-Informed Classrooms with Sustaining Climates Foster Compassionate Morality. In T. Lovat (Ed.), *International handbook of values education and student wellbeing (2nd ed.).* Routledge.

Narvaez, D. (2022). The moral education needed today: Decolonizing childhood and reconnecting children. In R. S. Webster, T. Airaksinen, P. Batra, & M. Kozhevnikova (Eds.), *Humanizing Education in the 3rd Millennium*. Springer Nature.

Nastevičs, U. (2017). *Tikumu audzināšanas sistēma japāņu un latviešu dievestības tekstos*. Rīga: LU.

Putri, S. A. C., Ayriza, Y., Khumalo, J., & Joitun, F. A. (2024). The Impact of Folklore-Based Storytelling on Empathy Behavior in Kindergarten Children. *International Journal of Islamic Educational Psychology, 5*(1), 142-160.

Vygotsky, L. S. (2012). *The collected works of LS Vygotsky: Scientific legacy*. Springer Science & Business Media.

Zalli, E. (2024). Globalization and education: exploring the exchange of ideas, values, and traditions in promoting cultural understanding and global citizenship. *Interdisciplinary Journal of Research and Development, 11*(1 S1), 55-55.

Article history
Received: 29 July, 2025
Accepted: 04 September, 2025

Analysis of Work Performance of International Referees in Judo

By Nuša Lampe[1], Florin Daniel Lascău[2], Husnija Kajmović[3] & Maja Meško[4]

Abstract: *The study examines the conditions for work effectiveness among elite international referees in judo and the role of factors such as experience, achievements and education in their work. The sample included referees (n = 63) who officiated at World Judo Tour (WJT) events under the auspices of the International Judo Federation (IJF) between 2018 and 2022. Data was collected through an online survey, which comprised questions on demographic characteristics and the Conditions for Work Effectiveness Questionnaire (CWEQ-II). The analysis revealed that the most prominent dimension of structural empowerment was access to opportunity, followed by access to resources, support, and information. Statistically significant positive correlations were identified between the number of medals won and major events officiated, and referees' perceptions of organisational support and empowerment. The findings highlight the importance of educational programmes such as those provided by the IJF Academy, which contribute to higher competencies, self-confidence and job satisfaction among referees. The study provides a basis for developing a comprehensive, global referee development model, which could enhance the quality of officiating, standardise educational approaches and support the sustainable development of referees in judo and other combat sports.*

Keywords: *referee education; IJF Academy; officiating in combat sports; human resource development in sport; CWEQ-II questionnaire*

The objective of this study is to examine the structural empowerment and work performance of international judo referees, exploring how education, experience and organisational support influence their perceived effectiveness and professional development within the IJF framework.

The study included referees who officiated at World Judo Tour (WJT) events between 2018 and 2022. This tour brings together the most prestigious competitions, such as the world championships, World Judo Masters, grand slams and grand prix, as well as the Olympic and Paralympic Games. Referees at these events are selected carefully by the IJF Referee Commission and represent top-level experts in their field. In addition to in-depth knowledge of the rules, they must demonstrate technical-tactical expertise, psychological stability and the ability to make fast decisions in stressful situations, key competencies for maintaining the quality of officiating at the global level.

Officiating at the highest level requires extensive experience, technical knowledge and mental stability. National federations adopt different approaches to training, whereas the IJF sets specific requirements for obtaining an international licence, including age, judo grade, national and continental experience, and demanding theoretical and practical examinations. The refereeing hierarchy is based on two types of licences: continental and international, with only the international licence enabling nomination for IJF events and competitions of other international sports organisations (IOC, IBSA, FISU).

The rules of judo are designed to ensure safety, fairness for all competitors and the sport's appeal to spectators. They evolve in line with trends in globalisation, technological progress and commercial pressures (Arias et al., 2011; Angus, 2006; Lampe, 2015; Cowen, 2022). Rule adjustments are an integral part of preserving the essence of Kodokan judo in a modern sporting context (Barta, 2022). Referees, athletes and coaches must constantly adapt to these rule changes, which increases the complexity of their work and highlights the need for systematic education.

Despite the crucial role referees play, they are often overlooked or perceived as a negative element of competition. This perception further underscores the importance of research into referees' personality traits, working conditions and educational needs. Like athletes, referees must be physically prepared, technically skilled and psychologically stable, as they make decisions that directly influence contest outcomes.

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Work performance in sport refers to the quality of task execution and is linked to productivity, work quality, collaboration and timeliness (Koopmans et al., 2014). Effective performance management involves regular feedback, evaluation of employee competencies and the design of strategies for their development (Možina, 2002). Research shows that high work performance fosters organisational success and employee motivation (Boštjančič & Tement, 2016; Griffin et al., 2000; Organ, 1997). In the sports industry, performance is assessed through a combination of results, technical skills, psychological resilience, and teamwork. Referees and coaches who have access to continuous education, mentoring and support achieve higher levels of professionalism and objectivity (Taylor et al., 2021). A holistic approach to referee development should include both technical and psychological preparation, as referees face exceptional pressures and responsibilities.

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Since judo is grounded in the philosophies of respect, discipline and lifelong learning, examining the relationship between education, organisational support and referees' work performance is essential for the sport's sustainable development. This article contributes to understanding the complexity of the refereeing role. It provides a foundation for the development of international education and support programmes for referees, which could also serve as a model for other sports.

MATERIALS AND METHODS

Sample of respondents

The sample included referees (n = 63) who officiated at the World Judo Tour (WJT) between 1st January 2018, and 31st December 2022. These referees completed the online survey in full, out of a potential pool of 93 respondents.

Within the IJF, two types of licences exist for officiating at international competitions. The first is the continental licence; examinations for this licence are conducted under the authority of the continental judo unions. Referees holding this licence may officiate at all competitions organised under the auspices of their continental and national judo federations. The second is the international licence, which represents the highest global licence for refereeing in judo. Examinations for this licence are conducted under the auspices of the IJF and only referees holding this licence may be nominated by name to officiate at IJF competitions. In this way, the IJF manages the selection of referees for events under its authority, as well as for competitions organised by other international sports bodies with which the IJF co-operates (IOC – International Olympic Committee, IBSA – International Blind Sports Association, FISU – Federation Internationale du Sport Universitaire).

Table 1 presents the number of international referees by continental judo union in 2017 and the number of those who officiated at WJT events during the period 2018–2022.

Table 1: Number of international referees officiating at WJT events from 2018 to 2022.

	Total number of referees with an A licence in 2017		WJT 2018–2022	
	men	women	men	women
Africa (AJU)	24	4	8	3
Asia (JUA)	26	6	16	5
Europe (EJU)	123	21	31	11
Oceania (OJU)	5	1	3	0
Pan America (PJC)	53	6	13	3
	231	**38**	**71**	**22**
	269		***93***	

Sample of variables

The questionnaire consisted of five sections. The first part included demographic questions, while the second comprised the CWEQ-II questionnaire with items adapted to the context of work within the IJF. The CWEQ-II (Laschinger et al., 2001) was adapted for the IJF context, measuring access to opportunity, information, support, and resources, and formal/informal power.

The CWEQ-II questionnaire was adapted carefully to the judo refereeing context by rephrasing workplace-related items into officiating situations (e.g., access to information from the IJF Referee Commission, feedback on performance, and opportunities for officiating at international events). Cronbach's alpha coefficients for each dimension confirmed acceptable internal consistency ($\alpha = 0.78–0.89$).

Procedure

The study was conducted with the consent of the IJF. The study was conducted using an online questionnaire, which consisted of a demographic section and the CWEQ-II questionnaire. All respondents participated voluntarily. The CWEQ-II (Laschinger et al., 2001) was adapted for the IJF context, measuring access to opportunity, information, support, resources, and formal/informal power.

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and opportunities for officiating at international events). Cronbach's alpha coefficients for each dimension confirmed acceptable internal consistency (α = 0.78–0.89).

Statistical analysis

The statistical analysis was performed using IBM SPSS Statistics, version 29.0, and IBM AMOS 29.0.

A non-probability sampling method was used due to the limited population of elite referees. The study was conducted between February and April 2024.

Although both male and female referees were included, gender-related differences were not analysed due to the small number of women in the sample, which represents a limitation of this study.

Due to the small sample size, non-parametric methods were applied for all analyses of differences and correlations. For ordinal variables, we presented basic descriptive statistics (mean = M, minimum value = MIN, maximum value = MAX, standard deviation = SD), while for categorical demographic data, we reported frequencies and percentages. The data collected through the survey was processed using IBM SPSS and AMOS statistical software.

New composite variables were derived by averaging the items within each question block.

The Kolmogorov-Smirnov test indicated that the distribution of some variables deviated from normality, which led us to use non-parametric tests for bivariate analyses. For easier content comparison, means were also reported. Relationships between the studied concepts were tested using the chi-square test of independence or Spearman's rank correlation coefficient. To compare item ratings between groups, we used the Mann-Whitney U test or the Kruskal-Wallis test. If the conditions for applying the χ^2 test were not met (i.e., cells with expected frequencies less than 5), we applied the Likelihood ratio or Kullback's $2\bar{\imath}$ alternative test.

RESULTS

In the sample, 44 men (69.8%) and 19 women (30.2%) were included. The age of respondents ranged from 36 to 61 years, with an average age of 48. Most respondents had attained a level seven education (42.9%), followed by those with a level six education (23.8%). The referees held different dan grades in judo, ranging from third to eighth, with the largest share holding fourth dan (27.0%) and sixth dan (22.2%).

Respondents were members of different continental judo unions, with the majority coming from the European Judo Union (49.2%). Most had completed the IJF Academy Level 1 practical module for referees (71.4%), while just under one-fifth had completed the full IJF Academy Level 1 education programme for coaches.

Of the 63 referees surveyed, 17.5% had won medals at major international competitions, while the largest group (46.0%) had won medals at national championships.

Table 2 presents descriptive statistics for the various CWEQ-II dimensions. For each derived dimension, mean values and standard deviations are shown, as well as the ratings of the core items that constitute each dimension. The most prominent dimension was "access to opportunity" (4.2 ± 1.0), followed by "access to resources" (3.8 ± 1.0), "access to support" (3.4 ± 1.2), and "access to information" (3.4 ± 1.1). Slightly lower values were observed for "informal power" (ORS) and "formal power" (JAS), both with an average score of 3.

Table 2: Basic descriptive statistics of CWEQ-II and derived variables.

	n	Min	Max	M	SD
ACCESS TO OPPORTUNITIES	**62**	**1**	**5**	**4.2**	**1.0**
Q13ga Challenging work	62	3	5	4.2	0.9
Q13gb Opportunity to acquire new skills and knowledge at the workplace	62	1	5	4.4	0.9
Q13gc Tasks that utilize all your skills and knowledge	62	1	5	4.1	1.2
ACCESS TO INFORMATION	**63**	**1**	**5**	**3.4**	**1.1**
Q13ha Current state of the IJF	63	1	5	3.5	1.2
Q13hb Values of the IJF senior management	63	1	5	3.4	1.2
Q13hc Goals of the IJF senior management	63	1	5	3.4	1.2
ACCESS TO SUPPORT	**62**	**1**	**5**	**3.4**	**1.2**
Q13ia Specific information about things you are doing well	63	1	5	3.5	1.3
Q13ib Specific remarks on things you could improve	63	1	5	3.4	1.2
Q13ic Helpful hints or advice for problem-solving	62	1	5	3.5	1.3
ACCESS TO RESOURCES	**63**	**2**	**5**	**3.8**	**1,0**
Q13ja Time available for necessary documentation	63	1	5	3.7	1.0
Q13jb Time available to complete work requirements	63	1	5	3.8	1.0
Q13jc Obtaining temporary help when required	63	1	5	3.7	1.1
FORMAL POWER (JAS)	**63**	**1**	**5**	**3.0**	**1.2**
Q13ka Rewards for innovation at the workplace are …	63	1	5	2.8	1.3
Q13kb Degree of flexibility in my job is …	63	1	5	3.3	1.1
Q13kc Degree of recognition of my IJF-related activities is …	62	1	5	3.3	1.2
INFORMAL POWER (ORS)	**63**	**1**	**5**	**3.1**	**1.0**
Q13la Collaboration with the IJF Refereeing Commission	63	1	5	3.5	1.4
Q13lb Being sought out by peers for help with problems	63	1	5	3.6	1.1
Q13lc Being sought out by managers for help with problems	62	1	5	3.0	1.3
Q13ld Seeking ideas from experts who are not referees	63	1	5	2.8	1.2

Note. n = number of units; Min = minimum value; Max = maximum value; M = mean; SD = standard deviation.

Table 3 presents the associations between the CWEQ-II dimensions and both ordinal and numerical sociodemographic variables of judo referees. The associations are expressed using Spearman's rank correlation coefficient (Spearman's rho) and p-value.

For age, the results showed a significant association with the variable "informal power" (ORS), with a positive correlation coefficient (rho = 0.473, p < 0.001), indicating that informal power increases with age. A similar pattern was observed for judo level, where there was also a statistically significant positive correlation with "informal power" (ORS). However, the correlation coefficient was somewhat lower in strength (rho = 0.301, p = 0.016).

A statistically significant positive correlation was found between the number of medals won at major competitions and the CWEQ-II dimension "access to opportunity" (rho = 0.275, p = 0.031). This suggests that achieving a higher number of medals at major competitions is associated with greater perceived access to opportunities. A similar finding applies to the number of major events officiated, where statistically significant correlations were observed with several CWEQ dimensions: "access to opportunity" (rho = 0.298, p = 0.019), "access to support" (rho = 0.350, p = 0.005), "formal power" (JAS) (rho = 0.357, p = 0.004), and "informal power" (ORS) (rho = 0.368, p = 0.003). All correlations were positive, meaning that officiating at a higher number of major competitions leads to higher scores across these CWEQ-II dimensions, reflecting a more positive evaluation or perception of different aspects of the work environment.

In line with these results, we can conclude that achievements during both sporting and refereeing careers (the number of medals won, the number of events officiated, and the number of major competitions officiated) are related to work performance. In contrast, the level of formal education, the total number of events officiated, and the average ratings received at competitions do not show statistically significant associations with CWEQ-II. Furthermore, both age and judo level are significantly related to one dimension of CWEQ-II (organisational relationship scale).

Table 3: CWEQ-II dimensions and correlation testing according to ordinal and numerical sociodemographic variables.

n=59-63		Access to opportunities II	Access to information II	Access to support II	Access to resources II	Formal power II	Informal power II
Q2 Age	Spearman's rho	-0.007	-0.162	0.041	0.062	0.151	**0.473****
Q3 Judo level (black belt degree)	p value	0.955	0.209	0.751	0.635	0.240	**0.000**
Q5 Highest attained level of formal education	Spearman's rho	-0.023	-0.093	0.015	-0.026	-0.098	**0.301***
	p value	0.859	0.467	0.904	0.840	0.446	**0.016**
Competitive result – no. of medals at international competitions							
Q9 No. of IJF competitions refereed 1.1.2018–31.12.2022	Spearman's rho	-0.067	-0.105	-0.065	-0.018	0.025	0.043
	p value	0.607	0.411	0.610	0.889	0.846	0.740
Q10 Average evaluation at IJF competitions refereed 1.1.2018–31.12.2022							
SOD_VT_st No. of IJF competitions refereed 1.1.2018–31.12.2022	Spearman's rho	**0.275***	0.125	**0.130**	**0.174**	-0.055	-0.092
	p value	**0.031**	0.328	**0.311**	**0.172**	0.671	0.474
Q2 Age							
Q3 Judo level (black belt degree)	Spearman's rho	0.210	0.149	0.224	0.172	0.179	0.160
	p value	0.104	0.248	0.081	0.180	0.164	0.213
Q5 Highest attained level of formal education							
Competitive result – no. of medals at international competitions	Spearman's rho	0.142	0.028	0.123	0.096	0.089	-0.007
	p value	0.287	0.834	0.351	0.469	0.503	0.956
Q9 No. of IJF competitions refereed 1.1.2018–31.12.2022							
Q10 Average evaluation at IJF competitions refereed 1.1.2018–31.12.2022	Spearman's rho	**0.298***	0.160	**0.350****	0.231	**0.357****	**0.368****
	p value	**0.019**	0.211	**0.005**	0.068	**0.004**	**0.003**

* The correlation is statistically significant at p < 0.05.
* The correlation is statistically significant at p < 0.01.

The analysis of differences and correlations between the sociodemographic characteristics of the sample and work performance variables showed statistically significant differences for the following variables:

- age,
- judo level (dan grade),
- participation in an IJF Academy education event,
- number of competitions officiated (including major events),
- competitive achievement (medal at major competitions).

The most important factor in this regard is professional refereeing experience, namely, whether the referee has already officiated at major competitions.

Referees with more experience at the highest-level events perceive greater support and formal power within the organisation. Education through the IJF Academy is associated with higher ratings of perceived opportunities and information.

Correct decisions are a key aspect of work performance, as they affect the quality of officiating directly.

Among the educational factors, the IJF Academy has the greatest impact, as it provides specialised training for referees at the elite level.

DISCUSSION

The relatively small sample size (n = 63) and the regional imbalance, with a predominance of European referees, should be considered when interpreting the findings. These limitations may restrict the generalisability of results but highlight the need for future cross-continental studies.

The results of the study confirm the crucial role of experience, education and organisational support in ensuring the quality and work performance of referees in judo. Referees who participated in a greater number of important competitions perceived higher levels of formal and informal power, as well as greater access to support. These results are consistent with Kanter's (1977, 1993) theory of structural empowerment, which emphasises that access to information, resources and support is essential for employee development and motivation. Our findings suggest that greater professional experience and integration with organisational networks enhance referees' confidence in their work and their perceived role within the international sports organisation.

The role of education and the IJF Academy

IJF Academy programmes, which include technical-tactical knowledge, rule interpretation, communication, and ethical standards, showed a direct impact on perceived opportunities and information. Research in other sports has demonstrated that structured educational programmes enhance professionalism, self-confidence and motivation among referees and contribute to the standardisation of procedures (Fransen et al., 2020; Taylor et al., 2021). Appropriate training leads to higher engagement and reduced burnout, which is particularly important for sports referees operating in demanding and stressful conditions.

Practical implications of the study

The findings support the development of systematic training programmes for referees, incorporating technical-tactical knowledge, psychological preparation, and mentoring. The IJF Academy represents a best-practice model that could be extended to other sports, as standardised education frameworks contribute to greater objectivity in decision-making and improve officiating quality. The results also suggest that referees with more experience and higher achievements are more integrated in the organisational environment, which leads to better decision-making and increases the professionalisation of their role.

The importance of empowerment in sports organisations

Effective empowerment enhances motivation and job satisfaction, while reducing staff turnover, which is particularly significant in sports organisations. Our results confirm that access to resources, information and support strongly influences referees' perceived effectiveness, thereby opening opportunities for strategic improvements in referees' working conditions and contributing to fairness and the credibility of competitions.

Directions for future research

Future studies should investigate the impact of cultural differences, mentoring and digital education tools on the long-term development of referees. Longitudinal research examining the influence of IJF Academy programmes and other education models on referees' professional careers would be beneficial. Developing structured systems for monitoring referee performance and empowerment could serve as a reference model for other sports organisations.

In summary, the combination of technical knowledge, experience and appropriate organisational support shapes professional referees, who can carry out their duties objectively and effectively at the highest international level.

CONCLUSIONS

Work performance refers to how well an individual fulfils their duties in the workplace, measured by factors such as productivity, quality of work, attendance, punctuality, and collaboration. It requires a combination of knowledge, skills, adaptability and communication. Employers monitor work performance through regular evaluations, which help to identify areas for improvement and reward achievements.

This study is the first to analyse the conditions for work effectiveness among top-level, international referees in judo.

The research highlighted key factors influencing referees' work performance in judo and confirmed the importance of experience, education and organisational support. The findings show that referees who participated actively in major competitions perceived higher levels of formal and informal power, as well as greater access to support, consistent with the theory of structural empowerment. Programmes such as those established by the IJF Academy have proven to be effective in enhancing referees' professionalism and motivation, further strengthening the quality and fairness of officiating.

Based on this study, the development of systematic training for referees is recommended, incorporating technical-tactical knowledge, psychological preparation, and mentoring, which would contribute to the professionalisation of their role. Effective empowerment, including access to resources and information, is proven to be essential in enhancing referees' perceived work performance.

REFERENCES

Angus, R. (2006). *Competitive judo: Winning training and tactics*. Human Kinetics.

Arias, J. L., Argudo, F. M., & Alonso, J. I. (2011). Review of rule modification in sport. *Journal of Sports Science and Medicine, 10*(1), 1–8.

Barta, V. (2022, January 9). Judo made understandable with amended rules. *JudoInside. https://www.judoinside.com/news/5065/Judo_made_understandable_with_amended_rules*

Boštjančič, E. (2007). *Vpliv vedenja in motivov vodje na pripadnost, delovno učinkovitost, motivacijo in zadovoljstvo zaposlenih* [Doctoral dissertation, University of Ljubljana, Faculty of Arts].

Boštjančič, E., & Tement, S. (2016). Kadrovska psihologija. In E. Boštjančič (Ed.), *Človek, delo in organizacija: Pregled psiholoških področij in perspektiv* (pp. 135–164). University of Ljubljana, Faculty of Arts.

Cowen, T. (2022, April 2). LASCAU: “IJF refereeing rules is never ending document.” *European Judo Union. https://www.eju.net/lascau-in-attendance-of-eju-referee-seminar-is-great-success*

Griffin, M. A., Neal, A., & Neale, M. (2000). The contribution of task performance and contextual performance to effectiveness: Investigating the role of situational constraints. *Applied Psychology, 49*(3), 517–533. *https://doi.org/10.1111/1464-0597.00029*

Kanter, R. M. (1977). *Men and women of the corporation*. Basic Books.

Kanter, R. M. (1993). *Men and women of the corporation* (2nd ed.). Basic Books.

Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., de Vet, H. C., & van der Beek, A. J. (2014). Measuring individual work performance: Identifying and selecting indicators. *Work, 48*(2), 229–238.

Lampe, N. (2015). *Pregled razvoja sodniških pravil v judu* [Undergraduate thesis]. University of Ljubljana, Faculty of Sport.

Laschinger, H. K. S., Finegan, J. & Shamian, J. (2001). The impact of workplace empowerment, organizational trust on staff nurses' work satisfaction and organizational commitment. *Health Care Management Review, 2*6(3), 7–23.

Možina, S. (Ed.). (2002). *Management kadrovskih virov*. University of Ljubljana, Faculty of Social Sciences.

Organ, D. W. (1997). Organizational citizenship behavior: It’s construct clean-up time. *Human Performance, 10*(2), 85–97. https://doi.org/10.1207/s15327043hup1002_2

Article history
Received: 18 September, 2025
Accepted: 03 November, 2025

The Biomechanics of Tori's Movement During Competition *Sutemi* (捨身技), *Makikomi* (巻込技) and *Tai Atari* (体當り)

By Attilio Sacripanti[1,2], Envic Galea[2,3], Florin Daniel Lascau[2,3]

Abstract: *A knowledge of the biomechanics of tori's movement during sutemi (捨身技 - sacrifice techniques), makikomi (巻込- wrapping techniques), and tai atari (体當り - body strike techniques) in judo is crucial for understanding the safety elements and effectiveness of the techniques. This study examined biomechanical information by analysing the entire body of tori during the execution of these techniques.*

We analysed tori's movement using original biomechanical models, considering balance when sacrificing to throw uke, and body mass when striking the opponent. General equations for sutemi, makikomi, and tai-atari were established, and their application in high-level male competition was analysed statistically. The results show that effective sutemi and makikomi execution depends on the correct use of tori's body mass. The biomechanical model revealed relationships between angular falling speed, body angle and athlete height. The model allowed us to evaluate the falling velocity, showing that angular velocity and acceleration were proportional to the gravitational acceleration and body-tatami angle, and were inversely proportional to athlete height. The stopping and sliding forces were directly proportional to the sum of tori and uke's mass and the body-tatami angle but are independent of the athlete's height.

Tai atari's force was quantified to evaluate its situational applicability in competition. This study has advanced the biomechanical understanding of sutemi, makikomi, and tai atari using two original theoretical models which highlight the importance of tori's movement. The findings obtained can influence training and competition strategies, enhance technique effectiveness, and reduce injury risks.

Keywords: *biomechanics; motor redundancy; leverage and torque; momentum and energy transfer; rotational impact.*

Sutemi-waza (捨て身技) refers to techniques in which *tori* deliberately compromises equilibrium as a tactical application, a principle first outlined by Jigoro Kano Shihan (Kano 1986). These techniques involve great commitment and risk, often resulting in spectacular throws. Understanding neurological principles, such as motor redundancy, is crucial for appreciating the efficiency of these complex movements and their applications in *sutemi-waza*.

Motor redundancy (Schmidt 2011, Sinh et al. 2025), the ability of the nervous system to generate numerous solutions for a given task, is crucial for dual-situation sports such as judo. This principle shows the importance of efficient technical execution by allowing the nervous system to co-ordinate redundant elements, optimising energy consumption. (Paillard 2010, Sacripanti 2016)

This study examines the biomechanics governing *sutemi* and *makikomi* techniques recognised by the Kodokan (Kano 1986), presenting two original theoretical mathematical models. Understanding the biomechanics of these techniques is vital when aiming to enhance their effectiveness, while ensuring athlete safety. Despite their importance, a comprehensive biomechanical analysis, particularly related to tori's body mass and motion dynamics, remains understudied. No scientific, biomechans publication deals with all *sutemi* and *makikomi* techniques as a whole, organically. There are sporadic studies on the biomechanics of individual techniques (Lacharwar and alt. 2025, De Angelis 2020, Iura 1991) and biomechanical analyses of technique groups, including some *sutemi-waza* (Imamura et alt. 2007, Hamaguchi 2024).

To address this gap in the literature, this study proposes two theoretical, biomechanical models which could provide coaches with insights for improving training strategies. Furthermore, this study includes *tai atari*, a technical tool using body mass impact to throw opponents. Changes in refereeing regulations have enhanced the use of *tai atari*, a metho rooted in ancient Samurai systems in Japan (Inogai 2018).

By connecting theoretical biomechanics and practical applications, this study explores the situational use and advantages of each technique group, offering insights for coaches, with data on technique utilisation in high-level male competition. The results will deepen the biomechanical understanding of sutemi, makikomi, and *tai atari*, emphasising the dynamic movement of tori's body mass.

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Before examining methodology and results, it is essential to understand how biomechanics supports the effectiveness of judo techniques and guides our analysis. For example, in *ma-sutemi-waza* (back sacrifice techniques), biomechanical analysis assists the understanding of how body weight distribution affects throws. It involves creating a perfect arc that uses the opponent's momentum during tori's fall. Biomechanics highlights the importance of kinetic chain movements that generate and transfer energy through the body. In *ma-sutemi-waza*, initiating movement from the abdomen and co-ordinating it through the limbs ensures optimal efficiency and minimises exertion. By understanding the qualitative mechanics involved, a coach can equip an athlete to achieve the most harmonious outcome. Biomechanical knowledge helps athletes identify potential issues before injuries occur, allowing them to adjust movements and reduce injury risk (Penichet-Tomas A. 2025).

Sutemi-waza involves engaging with an opponent on the ground; thus, mastering descent control safeguards both athletes. It emphasises purposeful falling rather than collapse. These considerations underscore the significance of biomechanical analysis in judo projections and justify our methodological approach.

METHODOLOGY

This study employed biomechanical methodology to examine *sutemi* and *makikomi* techniques in judo.

The investigation focuses on tori's actions, exploring how *tai atari* influences technique execution and serves as an auxiliary tool in others, such as *ashi-waza* throws (Sacripanti 2019).

A central aspect was motor redundancy. In dual-situation sports like judo, motor redundancy enables the nervous system to generate multiple solutions for a task. This adaptability optimises energy consumption of techniques by allowing efficient co-ordination of redundant elements. This principle is crucial for complex movements in sutemi, *makikomi* and *tai atari* techniques, where precise timing and control are essential (Shing and alt. 2025). The approach began with analysing *ukemi-waza* directions for all *sutemi* and *makikomi* techniques classified by the Kodokan, for both *tori* and *uke*, to ensure correct movement and athlete safety. Subsequently, videos of athletes' technical actions in competition were analysed, examining the use of body mass during execution to identify biomechanical principles. The study was conducted through video observations, supplemented by technical discussions between the authors: Envic Galea and Florin Daniel Lascau, 8th dan, and Professor Sacripanti, 7th Dan. This study allows the development of original theoretical models representing tori's body mass dynamics during *sutemi* and *makikomi* techniques,

and to formulate a general equation for the *tai atari* tool, highlighting optimal applicable methods for coaches' training and tactical implementation.

The following sections analyse these techniques, beginning with an overview, followed by the three-phase movement analysis with Jigoro Kano Shihan's method, study of fall directions for safety, and development of three original biomechanical models describing tori's body movement during execution.

BIOMECHANICAL ANALYSIS OF JUDO TECHNIQUES

An Overview of Tori's Body Movement

Building upon our understanding of judo's physical dynamics, this study examines tori's body movements during *sutemi-waza* execution, techniques requiring a strategic sacrifice of balance to throw *uke*. These techniques are categorised by Jigoro Kano Shihan and Kodokan classification into *ma-sutemi-waza*, *yoko-sutemi-waza* and *makikomi-waza* (Kano 1986), following biomechanical classification. All techniques belong to the lever group, with sutemi classified under maximum arm and *makikomi* under minimum arm subgroups (Sacripanti, 1987). Jigoro Kano and his assistants identified three phases in throwing dynamics through preliminary biomechanical analysis. He introduced a foundational triad to judo pedagogy: kuzushi (unbalancing the opponent), tsukuri (positioning for the throw) and kake (executing the throw). This triad serves as the fundamental building block of nage-waza and judo instruction. (Sacripanti 2014) No real temporal division exists between these phases; explicative artificiality allows the teaching of a single, continuous movement.

The issue of precedence between the first two phases was resolved through the Kodokan's early scientific research (Matsumoto 1978), which showed these phases were interconnected via electromyographic assessments. Thus, kuzushi and tsukuri phases are continuous movements that begin simultaneously. This division remains an instrumental system that facilitates the teaching of complex movements in simple steps.

The biomechanical analysis of tori's sutemi techniques involves three phases: 1. Kuzushi (disrupting *uke*'s balance to create an unbalanced position). 2. Tsukuri (positioning tori's body by lowering their centre of gravity). 3. Kake (executing the throw). *Tori* employs rotational and translational movements using one leg as a fulcrum, applying force with their arms to project *uke*'s body (Sacripanti, 2014).

The Kodokan recognises 19 techniques (Daigo 2005): ten sutemi, seven *makikomi* and two prohibited throws. The biomechanical analysis will examine these techniques to reduce the risk of injury, identifying the correct landing directions for both athletes, thus facilitating safer biomechanical models of body mass movement.

Table 1. *Sutemi-Waza* (捨身技) - Sacrifice Techniques: *Ukemi* Analysis

Ukemi analysis for ma-sutemi-waza	***Tori falls***	***Uke performs***
 ***Tomoe-nage [1]***	*Ushiro-ukemi*	*Mae-mawari-ukemi*
 ***Tomoe-nage competition actions [1]***	*Ushiro-ukemi*	*Yoko-mawari-ukemi (not Kodokan classified)*
 ***Sumi-gaeshi [2]***	*Ushiro-ukemi*	*Mae-mawari-ukemi*
 ***Sumi-gaeshi competition actions [1]***	*Diagonal ushiro-ukemi*	*Yoko-mawari-ukemi*
 ***Tawara-gaeshi [1]***	*Ushiro-ukemi*	*Mae-mawari-ukemi*
 ***Ura-nage [2]***	*Ushiro-ukemi*	*Mae-mawari-ukemi*
 ***Ura-nage competition actions [1]***	*Diagonal Ushiro-ukemi*	*Ushiro-ukemi*
Footnote: In the basic demonstration of *tomoe-nage*, *sumi-gaeshi*, *hikikomi-gaeshi*, *tawara-gaeshi*, and *ura-nage*, *tori* falls with the same *ushiro-ukemi* and *uke* performs the same *mae-mawari-ukemi*		
Note: The above technical illustrations were taken from five historical manuals and the numbers in the subscripts indicate their provenances. [1] (Daigo2005) [2] (Kazuzo Kudo 1967)		

Table 2. Ukemi Analysis – *Yoko-Sutemi-Waza*

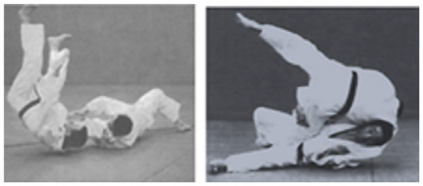
Ukemi analysis for yoko-sutemi-waza	*Tori falls*	*Uke performs*
 ***Yoko-guruma [2]***	*Diagonally to ushiro-ukemi*	*Diagonal mae-mawari-ukemi.*
 ***Yoko-gake [2]***	*Yoko-ukemi*	*Yoko-ukemi*
 ***Tani-otoshi [2]***	*Diagonally to the front of yoko-ukemi*	*Ushiro-ukemi*
 ***Tani-otoshi variant, also known as waki-otoshi [1]***	*Diagonally to the front of yoko-ukemi*	*Ushiro-ukemi*
 ***Tani-otoshi as a counter-attack to koshi-guruma [1]***	*Yoko-ukemi*	*Ushiro-ukemi*
 ***Uki-waza [1] - [2]***	*Diagonally to ushiro-ukemi*	*Diagonal mae-mawari-ukemi (often falling on the side)*
 ***Daki-wakare [1]***	*Diagonally to ushiro-ukemi*	*Diagonal mae-mawari-ukemi*
 ***Yoko-wakare [1]***	*Diagonal ushiro-ukemi*	*Mae-mawari-ukemi*
Note: The above technical illustrations were taken from five historical manuals and the numbers in the subscripts indicate their provenances. **[1]** (Daigo2005) **[2]** (Kazuzo Kudo 1967)		

Table 3. *Ukemi* analysis for *makikomi-waza*

Ukemi analysis for makikomi-waza	***Tori falls***	***Uke performs***
 ***Soto-makikomi [1]***	*Diagonally to mae-mawa-ri-ukemi**	*Mae-mawari-ukemi*
 ***Ko-uchi-makikomi [1]***	*diagonally to mae-mawa-ri-ukemi**	*Ushiro-ukemi*
 ***Uchi-makikomi [1]***	*Diagonally to mae-mawa-ri-ukemi**	*Mae-mawari-ukemi*
 ***O-soto-makikomi [1]***	*Diagonally to mae-mawa-ri-ukemi**	*Ushiro-ukemi*
 ***Uchi-mata-makikomi [1]***	*Diagonally to mae-mawa-ri-ukemi**	*Mae-mawari-ukemi*
 ***Harai-makikomi [1]***	*Diagonally to mae-mawa-ri-ukemi**	*Mae-mawari-ukemi*
 ***Hane-makikomi [2]***	*Diagonally to mae-mawa-ri-ukemi**	*Mae-mawari-ukemi*
Footnote makikomi: In *uchi-mata-makikomi*, *harai-makikomi* and *hane-makikomi*, *tori* is the same and *uke* performs the same *ukemi*.		

 ***Kani-basami [2]***	*Diagonally to yoko-ukemi*	*Ushiro-ukemi*
 ***Kawazu-gake [1]***	*Ushiro-ukemi*	*Ushiro-ukemi*
Footnote: According to current IJF refereeing rules *kani-basami* and *kawazu-gake* are forbidden in competition.		
Note: The above technical illustrations were taken from five historical manuals and the numbers in the subscripts indicate their provenances. **[1]** (Daigo2005) **[2]** (Kazuzo Kudo 1967) *(often falling on their side due to the stopping of the rotation for safety by their arm on the tatami)		

Not Kodokan classified as sutemi

Note: The above technical illustrations were taken from five historical manuals and the numbers in the subscripts indicate their provenances. **[2]** (Kazuzo Kudo 1967) **[3]** (Mifune1961) **[4]** (Sato and Okano1973) **[5]** (Kashiwazaki 1980)

No -waki **[2]** Ude-gaeshi **[3]** Ude-gaeshi **[4]** Kakae-wake **[3]** Obi-tori-gaeshi **[5]**

After analysing the fall directions of *tori* and *uke* for Kodokan-approved techniques, which relate to athlete safety, we examined tori's movement to understand the mechanics and apply them correctly and effectively, providing useful information for coaches and athletes

BIOMECHANICAL MODELS OF MOVEMENT IN THESE TECHNIQUES

Sutemi

To evaluate *sutemi* and *makikomi* techniques, we have developed theoretical biomechanical models that simulate tori's body movement during the application of *sutemi-waza*. The *ma-sutemi* techniques involve backward free fall of a body with increasing mass, as depicted in Fig. 1A, whereas the *yoko-sutemi* techniques entail side falls with increasing mass (*uke*'s mass), as illustrated in Fig. 1B. For the biomechanical analysis, we modelled the human body as a rigid cylinder (Sacripanti 2021). Both types of falls can be analysed the same way because the cylinders fall horizontally onto a surface. The distinction between the two types of technique is addressed by considering rotary motion with angular momentum variation, considering the position of tori's feet in both sliding and non-sliding scenarios. Here, h represents the body height, and M = m1 + m2 denotes the sum of the athlete's mass. Figure 1 illustrates a tori's body (cylinder) falling horizontally.

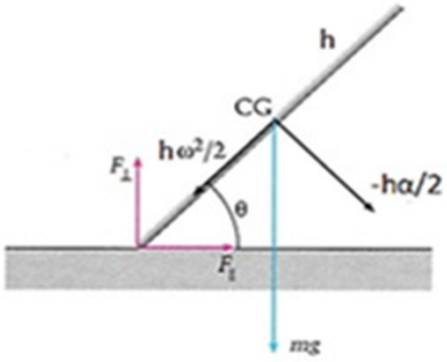


Fig.1 *Tori*'s body (cylinder) falling down

Fig.1 A *Ma-sutemi*

Fig.1 B *Yoko-sutemi*

If ω and α are the angular velocity and acceleration of the body, respectively, we can relate the vertical and horizontal components of the gravity centre (CG) acceleration before the sliding onset to angles θ and α. The acceleration of the centre of gravity is influenced by the angular acceleration (-hα/2) and centripetal force ((hω^2)/2), as shown in Figure 1. If SL (sliding) and ST (stopping) represent directions parallel and perpendicular to the tatami, respectively, Figure 1 shows that the accelerations SL and ST are:

$$\alpha_{SL} = -\frac{h\omega^2}{2}\cos\theta - \frac{h\alpha}{2}\sin\theta \qquad (1)$$

$$\alpha_{ST} = -\frac{h\omega^2}{2}sin\,\theta + \frac{h\alpha}{2}cos\,\theta \qquad (2)$$

Both are negative because no energy dissipation occurs before sliding begins.

The total energy of the two bodies falling together is:

$$\frac{1}{6}Mh^2\omega^2 + \frac{1}{2}Mgh\sin\theta = \frac{1}{2}Mgh \qquad (3)$$

From this, we can evaluate both the square angular velocity and angular accelerations ω2 and α:

$$\omega^2 = \frac{3g}{h}(1-\sin\theta) \qquad (4)$$

$$\alpha = -\frac{3g}{2h}\cos\theta \qquad (5)$$

After performing calculations, we did not consider this study. It is possible to express the sliding and stopping forces, which will allow us, through their cases, to diversify the *tori* motions associated with two classes: *ma-* and *yoko-sutemi* (Hinrichsen 2021, Rod 2021, Kano 1986)

$$F_{ST} = \frac{Mg}{4}(1-3\sin\theta)^2 \qquad (6)$$

$$F_{SL} = \frac{3}{2}(\mathrm{Mgcos}\,\theta\,)(\sin\theta - 1) \qquad (7)$$

To understand how a judoka's body behaves during a fall (Laing 2010; van den Kroonenberg 1995; Pascoletti 2019), we can approximate by summing up how each body part contributes to the overall movement by means of the moment of inertia. Knowing the exact mass and dimensions of each body segment is necessary for the accurate calculation of the total moment of inertia of the body (Itot). In addition, the human body is flexible and rigid, which further complicates the calculations.

$$I_{tot} = I_{trunk} + I_{arm} + I_{leg}$$

$$I_{trunk} = \frac{1}{12}m_t\left(3r_t^2 + h_t^2\right)$$

Where

$$I_{arm} = \frac{1}{12}m_a\left(3r_a^2 + h_a^2\right) \qquad (8)$$

$$I_{leg} = \frac{1}{12}m_l\left(3r_l^2 + h_l^2\right)$$

where r is the half diameter of the trunk, arm and leg, and h is the relative length of the body part. Using the two values of the moment of inertia of bodies, it is possible to diversify the motion of *ma-sutemi* and *yoko-sutemi*. In

ma-sutemi, techniques are: tomoe-nage, sumi-gaeshi, tawara-gaeshi, hikikomi-gaeshi, obi-tori-gaeshi, and ura-nage.

The (feet/foot) of *tori* doesn't slip (FSL= 0), but it's still; therefore:
1. FST ≠ 0; and Itot = Itrunk + Iarms + ½ Ileg (9)
For ura-nage: FST ≠ 0; and Itot = Itrunk + Iarms + Ileg (10)

For all the yoko-sutemi, the (feet/foot) of *tori* is not still, then FST = 0 2.FSL≠ 0 and Itot = Itrunk + Iarms + Ileg (11).

Tomoe-nage equation (9) | Ura-nage equation (10) | Yoko-gake equation (11)

Fig 2 Judo actions relative to the previous equations 9,10,11

These conditions allowed us to evaluate the falling velocity, showing that the angular velocity and acceleration were proportional to the gravitational acceleration and body-tatami angle and inversely proportional to the athlete's height. The stopping and sliding forces depend on the sum of the *tori* and *uke* masses and the body-tatami angle but are independent of the athlete's height.

A) *Makikomi* tool for direct attack or technical finishing

In judo, athletes' bodies are connected by their arms, which apply push-pull forces in all directions. The action of one body moving away from or toward another can be compared with the dynamics of a body subjected to elastic forces. According to Bertrand's theorem, only closed orbits (circular trajectories of motion) act under generalised elastic forces in judo movements, as in the dynamic clashes between *tori* and *uke*.

$$F=-kx^{\alpha} \qquad (12)$$

Only for α = 1 and α = -2, as demonstrated by Goldstein (2000), *tori* uses unique trajectories, called "General Action Invariants" (GAI) (Sacripanti 2010) to apply the lever or torque techniques defined earlier. (Sacripanti 1987) The next figure shows similar trajectories as *tori* takes a contact point for a rapid internal rotation, applying the lever or torque to throw *uke*. In terms of the elastic field, tori's trajectories resemble the trajectory of the capture of one particle by another in the elastic field with internal forces.

$$F_{ab}=-F_{ba}= F \quad (13)$$

In this case, the two particles acted as athlete bodies during the inward rotation throw (Teodorescu 2009)

Fig 3. The trajectory of a capture particle, similar to *tori*'s throwing inward trajectory in judo *makikomi* (Teodorescu 2009).

Almost-plastic collision of the extended bodies

The trajectory ends in a projection using a lever technique, starting with a collision (*tai atari*), which is considered almost plastic, as athletes are strictly connected, but bodies do not merge. When *tori* and *uke* collide, their bodies interact like a 'sticky' collision, moving together after impact. This 'almost-plastic collision' concept is crucial for understanding momentum transfer during throws. With equal mass between athletes, the equations were easy to obtain (Stronge, 2018). If they have different starting velocities, they remain connected until the fall, which is considered a free fall. With gravity force negligible at the start but increasing after the collision, until *Uke*'s landing, it is possible to write for early collision instants, as it is a rotational impact (Di Benedetto 2011)

$$mv_1 + mv_2 = 2mv \quad (14)$$

the conservation of ang. momen. give us $I_1\omega_1 = (I_1 + I_2)\omega_f$ 15)

$$or \frac{\omega_f}{\omega_1} = \frac{I_1}{(I_1+I_2)} \quad (16)$$

the impact is totally inelastic, and the loss of kinetic Energy give us:

$$\Delta K = \frac{1}{2}I_1\omega_1^2 - \frac{1}{2}(I_1 + I_2)\omega_f^2 = \frac{1}{2}\frac{I_1 I_2}{I_1 + I_2}\omega_1^2 \quad (17)$$

Full rotation with free fall

The complex rotational application of a judo *makikomi* connects to direct attacks using lever techniques, with inward and outward rotation, or as finishing tactics after throws like uchi-mata, hane-goshi, harai-goshi and ko-uchi-gari. The physical model was a spinning top with variable rotational inertia. For *tori* as an observer, the velocity transformation formula from the inertial frame to the rotating frame shows how speed is evaluated during rotating throws, as previously described (Sacripanti, 2014).

$$v = V + \left(\frac{dr'}{dt}\right)_o = V + (v' + \omega \wedge r') \qquad (18)$$

It is important to evaluate the general equation of motion for this variable mass spinning up, remembering the classic Newton approach to rotational dynamics (Crabtree 1909) as follows:

The torque on the first athlete τ will be

$$\tau = r F \quad (19)$$

where r is the radius between the centre of mass and the point at which the force F is applied.

In terms of the rotational dynamics, this equation can also be written as

$$\tau = I\, d\omega/dt = mr^2\, d\omega/dt \quad (20)$$

To evaluate the general equation of motion for this variable mass spinning up, we recall Newton's classic approach to rotational dynamics (Crabtree 1909):

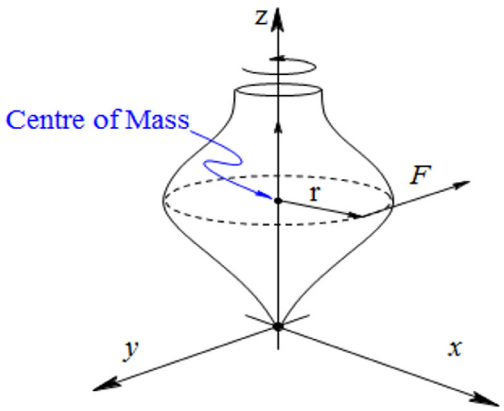


Fig. 4 Spinning Top

The Euler representation of a rotating rigid body (tori) produces a non-linear system of equations that are not always solvable analytically. The equations of motion for the Euler angle, as determined by Garanin (Garanin 2008), are as follows:

$$\begin{aligned}
\dot{\theta} &= \left(\frac{1}{I_1} - \frac{1}{I_2}\right) L \sin\theta \sin\psi \cos\psi \\
\dot{\varphi} &= \left(\frac{\sin^2\psi}{I_1} + \frac{\cos^2\psi}{I_1}\right) L \\
\dot{\psi} &= \left(\frac{1}{I_3} - \frac{\sin^2\psi}{I_1} - \frac{\cos^2\psi}{I_1}\right) L \cos\theta
\end{aligned} \quad (21)$$

Note that equations for $\dot{\theta}$ (nutation) and $\dot{\psi}$ (spin) form an autonomous system that can be solved first; after that, the equation for precession can be integrated using the found spin to obtain the solution. With the *makikomi* movement, the athlete tilts (Rose 2011) and the rotational axis through angle φ, as shown in Figure 5, becomes more complicated than that of a spinning top. The case of a tilted athlete applying a *makikomi* movement is shown in Figure 6, where gravity pulls the centre of mass down, pulling a non-spinning athlete downward and increasing the tilt angle φ, causing both athletes to fall. In a spinning top, the torque and change in the angular momentum vector are perpendicular to axis uˆ, leading the top to move 'sideways' in a circle around the z-axis, called the precession. However, this phenomenon is nullified because of the increased mass of the system that connects the two athletes' falls after the almost-plastic collision.

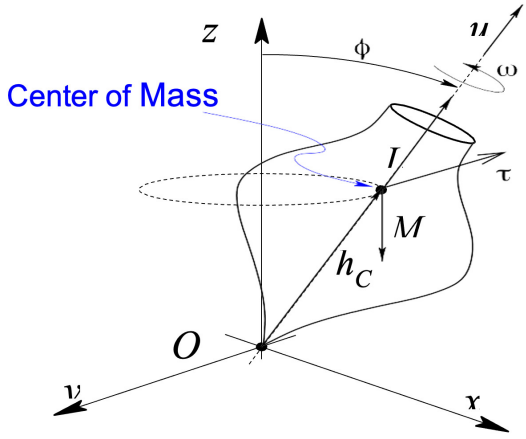


Fig. 5 Tilting spinning top

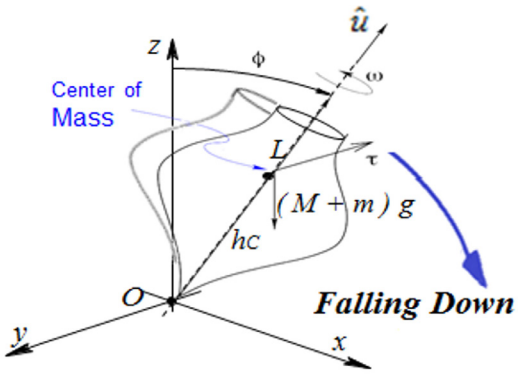


Fig. 6 Variable Inertia Falling Spinning Top. (*Makikomi* mechanics)

The three-dimensional equation becomes

$$\tau = r \Lambda F \quad (22)$$

$$\tau = \frac{d(I\omega)}{dt} = \frac{d[(M+m)\omega]}{dt} \quad (23)$$

After contact, the mass increases, as in variable mass systems (Irschik 2014), the velocity decreases and the external gravity force overcomes the precession motion, causing the body to drop. The *makikomi* movement serves as a direct attack and tactical tool. This model showed that the required torque was proportional to the athlete's mass and tori's angular velocity.

B) Evolution Trends in Throwing
The use of Tai-Atari [体(Tai): "body" 當 (Atari): "hit" or "strike"] **An active method of using body mass by impact-to-throw.**

In *sutemi-waza*, tori's body mass with hips, legs and arms generates a throwing force without colliding with *uke*, except at the fulcrum. In *tai atari*, *tori* used body mass to push opponents to the ground, which is common in modern competitions. These corollaries determine the directional force used in throwing movements (Ikai, 1958; Sacripanti, 2015). Advanced dynamic imbalance: 1. Breaking body symmetry (Sacripanti 2014) shifts the COM, increasing the stability of *uke* by 2. Timing fits the body's unbalanced position during collision 3. The forces remained effective in the 360° horizontal plane. These terms unify the biomechanical forces for the imbalance of *uke* during throws. Tai-atari relies on body mass to overpower opponents. In modern judo positioning, *tori* faces opponents. Impact: *tori* uses mass to disrupt balance. Throw: *tori* completes the technique. Macroscopic collisions involve energy dissipation. With adhesion, collisions can be perfectly inelastic with maximal energy loss (Preclik 2018). Athletes' direct impact is almost-plastic collision. When athletes grab during a collision, adhesion ensures same-speed movement. In inelastic collisions: (1) Total energy is conserved in inelastic collisions. (2) Kinetic energy loss (3) Linear momentum conservation (Goldstein 1960). For two-athlete direct-body collision, linear momentum expression remains the same. However, kinetic energy expression is modified to

$$\frac{1}{2}m_1u_1^2+\frac{1}{2}\ m_2u_2^2=\frac{1}{2}m_1v_1^2+\frac{1}{2}\ m_2v_2^2+\delta \quad (24)$$

where δ is the positive kinetic energy dissipated in the collision between athletes. When a judoka applies *tai atari*, the second body is almost still before the collision and conservation of momentum and energy are modified as

m_1 u_1=m_1 v_1+m_2 v_2 (25)

$$\frac{1}{2}m_1u_1^2=\frac{1}{2}m_1v_1^2+\frac{1}{2}\ m_2v_2^2+\delta \quad (26)$$

After calculating, from the conservation of momentum, because athletes' bodies stick together, the unknown velocity after the collision is

$$v_2=\left(\frac{m_1}{m_1+m_2}\right)u_1 \quad (27)$$

if u_1 is the 'known' *tori* attack velocity.

The maximum energy dissipated during the collision attack was

$$\delta_{max}=\frac{1}{2}\left[\frac{(m_1m_2)}{m_1+m_2}\right]u_1^2 \quad (28)$$

From these results, we understand that the attack velocity is the most critical parameter; the greater the attack velocity, the greater the energy dissipation during collision. If athletes have the same weight or mass M, the maximum energy dissipated will be

$$\delta_{max}=\frac{1}{4}Mu_1^2 \quad (29)$$

Then, the final velocity for the falling down of athletes' bodies, in this special case, will be

$$v_2=\frac{1}{2}u_1 \quad (30)$$

With inactive contrasting forces of *uke*, the applied power is greater, increasing both the maximum dissipation and the falling velocity. Our model shows that the final falling velocity and energy dissipation depend on the starting velocity of *tori* and are inversely proportional to the body masses with different mass numerators. With equal mass, the final velocity depends only on the initial attack velocity and is independent of body mass. The following figures (Sacripanti 2022) exemplify the *tai atari* attack with *ashi-waza* (leg techniques) in competition, specifically ko-uchi-gake and o-uchi-gake.

Figg. 7-8 Right ko-uchi-gake with tai-atari (Sacripanti 2022 pag. 80)

Figg.9-10 Left and right o-uchi-gake with tai-atari (Sacripanti 2022 pag. 80)

After establishing the biomechanical underpinnings of the sutemi, makikomi, and tai-atari techniques, we discuss their practical applications. This section translates biomechanical analysis into insights for coaches and athletes, focusing on strategies and their competitive advantages.

RESULTS

Effective Use of Body Mass in *Sutemi* and *Makikomi* Techniques

Sutemi and *makikomi* rely on the body mass of tori. *Sutemi* techniques: falling velocity, angular velocity and acceleration are proportional to gravity acceleration and body angle with the tatami and are inversely proportional to the athlete's body height. The stopping and sliding forces depend on the combined masses of *tori* and *uke* and on tori's body angle with the tatami.

Makikomi techniques: torque is proportional to the athletes' masses and to the angular velocity applied by *tori* to *uke*, underlining body mass application.

General Equation for *Tai Atari*

A general equation was defined for *tai atari* to assess its situational applicability. *Tai atari* leverages tori's body mass during impact to facilitate the opponent's push to the ground. This study also clarifies its competitive advantages and disadvantages.

Energy Dissipation and Final Falling Velocity

The final falling velocity and energy dissipation depend on tori's starting velocity and are inversely proportional to the combined body mass. For athletes of equal mass, the final velocity depends only on the attack's starting velocity.

Statistical Findings in High-level Competition

Data was linked to the IJF weight categories (Sacripanti, 2021). Light categories (60-65 kg) preferred *sutemi* techniques (11-16% effective rate), while heavyweight categories (100 to +100 kg) favoured *makikomi* (5% intensity).

The Analysis of the Effectiveness of *Sutemi-waza* in Competition is Based on a Simple Informative Summary.

The authors examined *sutemi-waza* and *makikomi* effectiveness (ippon) by linking all grand slam events worldwide from October 2020 to May 2021. There is no significant variation in the percentage use of *sutemi-waza* (Sterckowicz 2013; Sacripanti 2021; Sacripanti and Lascau in Preparation).

The research material included IJF video recordings of six grand slam events from October 2020 to May 2021, plus the Doha World Judo Masters held 11th to 13th January 2021. The complete statistics, analysed with IBM SPSS statistics software, will be presented in a forthcoming article (Sacripanti and Lascau in Preparation). Here, we present a simple summary of the techniques' percentage use. Data was selected from male medallists (gold, silver and two bronze medallists) and their opponents, in all weight categories. The sample was based on seven competitions, totalling 947 contests, including 196 medallists and their opponents who performed 800 successful throws (ippon) and 127 ne-waza victories. A total of 947 contests were analysed: 137 extra lightweight (-60 kg), 140 light middleweight (-66 kg), 138 lightweight (-73 kg), 141 middleweight (-81 kg), 136 middleweight (-90 kg), 135 middle heavyweight (-100 kg) and 120 heavyweight (+100 kg). The contests were in preliminaries, quarter-finals, semi-finals, repechage, bronze medal contests, and final. The following tables provide an overview of the contests in all seven IJF competitions, divided by weight.

Tab 1 Global most important results about all seven IJF competition (Sacripanti & Lascau in preparation)

Weight category Kg	Fight N.	3 shido (%)	Golden Score (%)	Total Throws N.	Lever Group %	Couple Group %	Shortest fights %
-60	137	12 (8.7 %)	27 (19.7%)	120	63%	37%	8.7
-66	140	33 (24,0%)	36 (25.7%)	100	64%	36%	12.1
-73	138	16 (11.6%)	27 (19.5%)	124	41%	59%	10.8
-81	141	28 (19.8%)	25 (17.7%)	110	59%	41%	13.4
-90	136	28 (20.6%)	26 (19.1%)	105	52%	48%	19.1
-100	135	15 (11.1%)	23 (17,0%)	141	51%	49%	15.5
100	120	15 (12.5%)	16 (13.3%)	100	52%	48%	21.6
Tot	947	147 (15.6%)	180 -19%	800	434 (54%)	366 (46%)	136 .(17%)

For understanding throwing techniques and biomechanical groups, the following table shows Japanese terminology for the utilisation of throws and their biomechanical groups.

Tab.2 Most applied effective throwing techniques in all seven competitions (biomechanical group, Japanese name and relative percentage) (Sacripanti & Lascau in preparation)

Biomec. group	Japanese name	Total number	Tot %	Group %
LEVER 54% 434	Seoi-otoshi	103	12.8%	23.7%
	Sumi-otoshi	79	9.8%	18.2%
	Sumi-gaeshi	30	3.7%	6.9%
	Sode-tsuri	29	3.6%	6.6%
	Tai-otoshi	23	2.8%	5.3%
	other waza	170	21,30%	39,30%
	Total group	434	54%	100%
COUPLE 46% 366	Uchi-mata	83	10.3%	22.5%
	Ko-soto-gari	70	8.7%	19.1%
	O-uchi-gari	67	8.3%	18.3%
	Ko-uchi-gari	61	7.6%	16.6%
	O-soto-gari	55	6.8%	15,00%
	other waza	30	4,30%	8,50%
	Total group	366	46%	100%

Sutemi-waza are preferred by lightweights (60-66 Kg), with 11–16% of the techniques applied. Heavy weights (over 90 kg) preferred *makikomi* at approximately 5%. Middleweights (67-90 Kg) applied both *sutemi-waza* and *makikomi* at 6–7%. The application frequency is low compared to seoi-nage or uchi-mata, which have 35–40% effectiveness. The high effectiveness of *sutemi-waza* among lightweights stems from its optimal leverage and momentum, as shown in the biomechanical analysis. Given these biomechanical benefits, further research could unlock competitive advantages. Understanding the biomechanical forces in *sutemi-waza* allows coaches to train athletes to execute movements aligned with body mechanics, thereby reducing injury risks through proper alignment and force distribution. Future studies should quantify these advantages using empirical data analysis. The next section presents practical outcomes of biomechanical examinations of *sutemi-waza*, *makikomi* and *tai atari* in high-level judo competitions.

DISCUSSION

Due to the lack of biomechanical models for *sutemi* and *makikomi* techniques, similar to those presented in this study, and given the inadequate coverage of the topic in global scientific publications, as stated in the introduction, the authors decided that, as developing this paragraph was impossible with normal content like analysis of findings, comparison with previous studies, and future research directions, they will focus the discussion on strengths, weaknesses, findings analysis and future research directions. Instead of comparative discussion, we present a more practical analysis for coaches and athletes, with implications for training and competition. This analysis was developed from our experiences as referees, competitors, coaches and teachers.

For coaches, understanding advantages and disadvantages of these techniques helps because they are 'extreme' techniques where *tori* risks everything for victory. These insights can help coaches recommend techniques based on contest dynamics and opponent behaviour. See Table 3. The recommendations are presented as statements in a table format to facilitate better recall.

In our biomechanical model of *sutemi-waza* related to optimal angular falling velocity depend on gravity acceleration and body angle, inversely relating to athlete height. These findings offer practical guidance for coaches training athletes. The study determined optimal torque for makikomi, providing guidance on using body mass during execution to enhance performance. By understanding the biomechanics, athletes can leverage body mass better for powerful, efficient throws. The application of *Tai atari*, where body mass collisions are focal, is highlighted for effectiveness in *makikomi* and special throwing techniques (ashi-waza) used in high-level competitions. The general equation for *tai atari* offers a fundamental resource for understanding when and how to use this technique strategically in competitions.

The strengths of this work include the first comprehensive treatment of the subject from a biomechanical perspective and the original physical models. These, even with their inevitable simplifications, will not only guide new and more targeted research, but also provide essential quantitative data for coaches. Furthermore, despite their simplicity, the models themselves are useful for understanding the inner mechanics of these techniques better. It is interesting to underline that the strengths are, at the same time, also the weaknesses of this study; in fact, the models developed are, given the complexity of the competitive dynamics, extremely simplified, despite their originality, and can therefore provide only partially applicable indicative information to the competitive moment.

Practical Applications and Implications for Coaches and Athletes

Tab 3 - Coaching information: useful coaching information about *sutemi-waza* and makikomi

Situational Use	Advantages	Disadvantages
Ma-sutemi: Used when opponents push forward aggressively, utilising their momentum. *Yoko-sutemi-waza*: Effective when opponents resist, allowing force application from different angles. Makikomi-waza: Safer techniques for referees to evaluate, usable as direct attacks or finishing tactics. (Sacripanti 2021)	- Surprise element against forward-pressing opponents - Leverages opponent's momentum with less strength - Versatile application in various positions - Effective against defensive opponents - Allows directional control - Utilises body weight effectively	- Risk of counter-attack if executed incorrectly - Requires precise timing and control - Physical impact from falling - Ground vulnerability if technique fails - Complex execution challenges referee evaluation - Requires high skill level - Recovery time affects match pace

Effectiveness of Tai-Atari

The effectiveness of Tai-Atari relies on the following biomechanical principles, tab 4 and 5:

Tab 4 Biomechanical principles in tai-atari

Centre of Gravity	Kinetic Chain	Leverage and Momentum
Lowering centre of gravity before impact enhances stability and power.	Movement originates at the feet, through hips to torso, maximising impact force.	Striking at the right angle uses opponent's momentum for effective throws.

General Movement

Tab. 5 Time steps in Tai-Atari attack

Initial Engagement	Executing Impact
Grip: *Tori* grips opponent's judogi for control. **Feet Positioning**: Feet shoulder-width apart with bent knees for stability.	**Body Movement**: Tori drives forward using legs and hips. Impact can be rotational (as in makikomi) or direct. **Timing**: Impact should match opponent's movement for off-balance. Transition to Throw: **Follow-Up**: *Tori* transitions quickly to throwing. Control: Maintain grip and body position throughout throw.

Tactical Use in Competition

Tai-Atari is a core component of competition, using body mass and its impact on tactical advantage. Tab 6

Tab.6 Miscellaneous information on *Tai Atari* tactical use

Tactical Application:	Psychological Impact:	Footwork:	Timing:	Technique Refinement:
Tai-Atari breaks an opponent's stance to create openings for complex techniques. (gensoku-no-genkei advanced Form) (Sacripanti 2022)	A well-executed tai-atari can intimidate opponents, disrupting their confidence. Modern adaptation: tai-atari focuses on efficiency in modern judo	Proper footwork is crucial for optimal positioning	Strike and throw timing is critical to catch opponents off guard.	Practice helps execute tai-atari smoothly, continuously and effectively.

Given these biomechanical and tactical benefits, further research could provide competitive advantages. Understanding biomechanical forces in *sutemi-waza* allows coaches to train athletes to execute movements aligned with body mechanics, reducing injury risk through proper alignment and force distribution.

Future studies should quantify these advantages using empirical data analysis. With the mechanical models presented here, future biomechanical research will benefit from a solid theoretical basis for exploring the topic. The transition to quantitative assessments will be more fruitful. The study of athlete safety will be facilitated by identifying the key mechanical parameters.

CONCLUSION

This study provides a comprehensive analysis of the biomechanics of sutemi, *makikomi* and tai-atari, emphasising the role of tori's body mass and the dynamics of physical lever application in executing these throws effectively.

By analysing specific techniques and their applications, this study extends our knowledge of judo biomechanics and offers insights for coaches and athletes. The goal is to enhance the effectiveness and safety of judo techniques, contributing to the sport's evolution and practitioners' success.

Our biomechanical analysis of *sutemi-waza* revealed that optimal angular falling velocity relates to gravity acceleration and body angle and is inversely related to athlete height. These insights guide athletes and coaches in technique effectiveness during competitions while minimising injury risk.

The study determined optimal torque for *makikomi* techniques, providing guidance on utilising body mass during execution to enhance performance. Understanding these biomechanical aspects helps athletes leverage body mass for powerful throws.

The application of tai-atari, where body mass collisions are key, is effective in *makikomi* and special throwing techniques (ashi-waza) used in high-level competitions. The general equation for tai-atari offers a resource for understanding when to use this technique competitively.

This research, with its biomechanical models, contributes to judo biomechanics, providing insights into sutemi, makikomi, and tai-atari techniques. These findings can influence training methods, enhance technique effectiveness and reduce injury risk. Future research could explore biomechanical differences between practitioners and optimise techniques through targeted training. Applying these findings could help develop training programmes to enhance athletic performance. Further investigations could examine the transferability of these biomechanical principles across martial arts to evaluate commonalities in technique execution. This will expand understanding of the applications of these principles. The theoretical biomechanical models, given competitive dynamics complexity, are simplified; despite their originality, they provide general indicative information applicable to competition.

REFERENCES

Crabtree, J. H. (1909). Elementary treatment of spinning tops and gyroscopic motions. London: *Longmans, Green and Co*.

Cross, R. (2021). The fall of an inclined rod. *European Journal of Physics, 42*(5), 055005. https://doi.org/10.1088/1361-6404/ac0c6a

Daigo, T. (2005). Kodokan judo throwing techniques. *Tokyo: Kodansha International*. ISBN 4-7700-2330-8

De Angelis, M. (2020). Base of support manipulation and center of mass trajectories in yoko sutemi waza *Doctoral dissertation, Politecnico di Milano*.

Di Benedetto, E. (2011). *Classical mechanic*s. Basel: Birkhäuser. ISBN 978-0-8176-4526-7

Garanin, D. (2008, November 28). Rotational motion of rigid bodies. *Cluny Graduate Center. Retrieved from* https://www.lehman.cuny.edu/faculty/dgaranin

Goldsmith, W. (1960). Impact. *London: Edward Arnold*.

Goldstein, H., Poole, C., & Safko, J. (2000). Classical mechanics (3rd ed.). *San Francisco: Addison-Wesley*. ISBN 978-8131758915

Hamaguchi, K., Furukawa, T., Takeuchi, S., Sasakawa, Y., & Deguchi, T. (2024). Biomechanical analysis of judokas' throwing techniques: focus on the preparation phase. *International Society of Biomechanics in Sports Conference Papers*.

Hinrichsen, P. F. (2021). The physics of falling chimney stacks. *Physics Education, 56*(5), 055023. https://doi.org/10.1088/1361-6552/ac0b0a

Ikai, M., & Matsumoto, D. (1958). The kinetics of judo. *Bulletin of the Association for the Scientific Studies on Judo, Kodokan Report 1*. Tokyo: Kodokan.

Imamura, R. T., Hreljac, A., Escamilla, R. F., & Edwards, W. B. (2007). A kinematic comparison of the major judo throwing techniques. *Journal of Sports Science and Medicine, 6*(CSSI-2), 20–27.

Inogai, T., & Habersetzer, R. (2018). Judo kata. *Paris: Budo Éditions*. ISBN 978-2-84617-410-7

Irschik, H., & Belyaev, A. (2014). Dynamics of mechanical systems with variable mass. *Vienna: Springer*. ISBN 978-3709118085

Iura, H. (1991). A biomechanical study on Tomoe-nage of judo techniques. *Research Journal of Budo, 23*(3), 24–34.

Kano, J. (1986). Kodokan judo. *Tokyo: Kodansha International*. ISBN 4-7700-1799-5

Kudo, K. (1967). Dynamic judo: Throwing techniques. *Tokyo: Japan Publications Trading Company*.

Kashiwazaki, T., & Donovan, T. (1984). Fighting judo. *London: Pelham Books*. ISBN 978-0720715941

Lakarwar D., Singh R., Yadav L., (2025) A Comparative Study Of Kinematic Analysis of the Tomoe Nage of Judo Technique *IJCRT, Volume 13, Issue 7 July 2025 | ISSN: 2320-2882*

Laing, A. C., & Robinovitch, S. N. (2010). Characterizing the effective stiffness of the pelvis during sideways falls on the hip. *Journal of Biomechanics, 43*(9), 1898–1904. https://doi.org/10.1016/j.jbiomech.2010.03.022

Matsumoto, D., Takeuchi, Y., Nakamura, R., Tezuka, M., & Takahashi, K. (1978). Analysis of the kuzushi in the nage waza. *Bulletin of the Association for the Scientific Studies on Judo, Kodokan Report V*. Tokyo: Kodokan.

Mifune, K. (1961). Canon of judo. *Tokyo: Seibundo Shinkosha*.

Paillard, T. (2010). Optimisation de la performance sportive en judo. *Bruxelles: De Boeck*. ISBN 978-2804107833 (in French)

Pascoletti, G., Catelani, D., Conti, P., Cianetti, F., & Zanetti, E. M. (2019). A multibody simulation of a human fall: Model creation and validation. *Procedia Structural Integrity, 18*, 394–401. https://doi.org/10.1016/j.prostr.2019.08.052

Preclik, T., Eibl, S., & Rüde, U. (2018). The maximum dissipation principle in rigid-body dynamics with inelastic impacts. *Computational Mechanics, 62*(1), 81–96. https://doi.org/10.1007/s00466-017-1495-9

Penichet-Tomas A. (2025). Applied Biomechanics in Sports Performance, Injury Prevention and Rehabilitation. *MPDI books 168 page*s March 2025 https://doi.org/10.3390/books978-3-7258-3529-4

Rose, M. E. (2011). Elementary theory of angular momentum. *New York: Dover Publications*. ISBN 978-0486684802

Sacripanti, A. (1987). Biomechanical classification of judo throwing techniques (Nage Waza). In *Proceedings of the 5th International Symposium of Biomechanics in Sport* (pp. 181–194). Athens, Greece. Retrieved from http://cdsweb.cern.ch/record/1111755

Sacripanti, A. (2010). Biomechanics of kuzushi-tsukuri and interaction in competition. *arXiv preprint*. https://arxiv.org/abs/1010.2658

Sacripanti, A. (2014). How to enhance the effectiveness of direct attack judo throws: Kano's dream—Judo rotational application. *arXiv preprint*. https://arxiv.org/abs/1401.1102

Sacripanti, A. (2014). A biomechanical reassessment of the scientific foundations of Jigorō Kanō's Kōdōkan jūdō. *arXiv preprint*. https://arxiv.org/abs/1206.1135

Sacripanti, A. (2015). Judo: The roads to ippon. Invited presentation at *Applicable Research in Judo Congress*, Zagreb.

Sacripanti, A. (2016). Judo biomechanical optimization. *arXiv preprint*. https://arxiv.org/abs/1604.08390

Sacripanti, A. (2019). The increasing importance of ashi waza in high-level competition: Their biomechanics and small changes in the form. *arXiv preprint*. https://arxiv.org/abs/1907.01220

Sacripanti, A. (2021). Judo biomechanical science for IJF Academy. IJF Academy Edition

Sacripanti, A., & Axmedov, F. (2021). *Dzyudo. Samarkand: Samarkand State Institute of Foreign Languages Publishing House*. ISBN 978-9943-7046-4-0

Sacripanti, A., & Lascau, F. D. (in preparation). Technical biomechanical analysis of all GS 2021.

Sacripanti, A. (2022). Gensoku no Genkei (□□□□□): A journey into the simplicity of movement. *IJF Academy Publication*.

Sacripanti, A. (2023). Biomecanica judo-ului. *Oradea: Duran's*. ISBN 978-606-8787-80-0

Sacripanti, A., & Ahmedov, F. (2021). Judo combat:

Time-motion analysis and biomechanical approach. *The Arts and Science of Judo, 1*(1).

Sato, N., & Okano, I. (1973). Vital judo. *Tokyo: Japan Publications*. ISBN 978-0870401732

Schmidt, R. A., & Lee, T. D. (2011). Motor control and learning: A behavioral emphasis (5th ed.). *Champaign, IL: Human Kinetics.* ISBN 978-0736079617

Singh RE, Davies JL,& Purcell C (2025) Editorial: Neuromuscular and kinematic dynamics in human movement adaptation. *Front. Hum. Neurosci*. 19:1724225. doi: 10.3389/fnhum.2025.1724225

Sterkowicz, S., Sacripanti, A., & Sterkowicz-Przybycień, K. (2013). Techniques frequently used during London Olympic judo tournaments: A biomechanical approach. *arXiv preprint*. https://arxiv.org/ftp/arxiv/papers/1308/1308.0716.pdf

Stronge, W. J. (2018). Impact mechanics (2nd ed.). *Cambridge: Cambridge University Press*. https://doi.org/10.1017/9781139050227

Teodorescu, P. P. (2009). Mechanical systems: Classical models (Vols. 1–3). *Dordrecht: Springer*. ISBN 978-9048127634

van den Kroonenberg, A., Hayes, W. C., & McMahon, T. A. (1995). Dynamic models for sideways falls from standing height. *Journal of Biomechanical Engineering, 117*(3), 309–318. https://doi.org/10.1115/1.2794186

Article history
Received: 22 October, 2025
Accepted: 10 November, 2025

Free to Perform
A New Paradigm to Optimise Sport Performance

By Martin Shotbolt[1] and Ruth S.L. Chiles[2]

Abstract: *Traditional Western sport psychology has focused on cognitive and behavioural methods to enhance performance through positive thinking, confidence and emotional regulation. However, advances in neuroscience and the understanding of neuroplasticity challenge these traditional assumptions. This paper offers a new paradigm that integrates neuroscience with psychology to help athletes, particularly judoka, achieve optimal performance.*

This framework expands on attachment theory, self-determination theory and Posner's theory of attention to improve athlete–coach relationships and strengthen athletes' mental, emotional and physical stability. It also explores how insecure attachment and adverse childhood experiences can hinder performance, highlighting the limits of conventional approaches. The hypothesis proposes that the state of Mushin, a deep, focused flow state, is not just psychological but is also rooted in nervous system regulation. By learning to manage their neurophysiological responses, athletes can systematically train to achieve greater confidence, balance and peak performance.

Keywords: *Mushin; attachement theory; nervous system regulation; intrinsic motivation; athlete-centred coaching; performance inhibition*

Traditionally in the Western World, sport performance psychology has focused primarily on cognitive and behavioural techniques to improve performance and accomplish competitive goals. These interventions are espoused to develop, in athletes, a positive mindset, offer strategies to build self-confidence and self-esteem, manage expectations, regulate emotional and physiological effects and prepare for competition mentally.

In this article we propose that rapid advances in neuroscience and our increased understanding of neurophysiology and neuroplasticity offers a fundamental challenge to the basic assumptions underpinning this traditional cognitive approach. A new paradigm built on this increased understanding offers athletes, including *judoka*, a new and exciting opportunity to realise their optimal performance potential.

We will introduce and explain the conceptual framework of the 'Free to Perform' hypothesis. It considers the value of extending Attachment Theory, the Self-Determination Theory and Posner´s Theory of Attention to understand and strengthen athlete/coach relationships and the internal psychology and physiology of *judoka*, aimed at training and enabling them to develop cognitive, affective and physical stability, confidence and balance.

We will explore the efficacy of traditional sports psychology, why *judoka* may experience performance difficulties, including the impact of insecure attachment and adverse childhood events and propose the hypothesis of Free to Perform as a framework of reconciliation. We will explain how an immersive and highly focused state of self-awareness known as *Mushin* (the state of Flow) is a function of the management of the nervous system; a skill that can be systematically learned.

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The Need for a New Paradigm

A review of the mental health research on elite and college athletes indicates that the current sports performance psychology paradigm is failing to support their wellbeing.

Unfortunately, there is only a limited body of research specific to mental health difficulties among the elite judo population. That which does exist focuses primarily on anxiety, mood, resilience and coping skills (Ciaccioni et al., 2023; Lopez-Lopez, et al., 2020; Muller, et al., 2021). Rossi C et al., (2022), state that psychological factors play a central role in *judoka* performance. They highlight the need for further research under 'standardised conditions' to understand the effects of these parameters on judo athletes better. Kim et al., (2022) in their quantitative correlational study, conclude that psychological factors significantly impact sports coping skills, with self-management serving as a crucial mediator but also stress the need for further research.

Our explorations also indicated limited research material relating to 'intervention effectiveness' i.e. which approaches and/or support interventions best suited *judoka*. Ziv and Lidor (2013) examined 18 studies focused on the psychological preparation of competitive *judoka*. He emphasises the scarcity of experimental designs to evaluate the effectiveness of psychological interventions. "Researchers should

strive to conduct additional studies on the effectiveness of imagery on judo performances, coping strategies for stress and anxiety, and strategies that help *judoka* cope with the phenomenon of choking under pressure."

We have therefore, quoted findings from a broader athletic population. We suggest it is applicable to *judoka* because, even though the *judoka* research is limited, it shows sufficient similarities with the overall athletic population. Additionally, both groups use the same sport psychology approach. We suggest that using the broader research gives a fuller picture of the depth and breadth of the mental health issues that sport psychology needs to address in general and that this is also applicable to the *judoka* population.

Vincent Gouttebarge et al., (2019) completed a systematic review and meta-analysis of 22 studies written in English. They offered the following conclusions, "Our meta-analyses showed that the prevalence of mental health symptoms and disorders ranged from 19% for alcohol misuse to 34% for anxiety/depression for current elite athletes, and from 16% for distress to 26% for anxiety/depression for former elite athletes."

A research study undertaken in the UK in 2018 indicates that the elite athlete population is particularly susceptible to common mental health disorders (CMDs). This joint research, undertaken by the Universities of Middlesex and Hertfordshire, revealed that almost half of the British (or English) elite athletes involved in the study displayed signs of anxiety/depression (47.8%) and over a quarter (26.8%) showed signs of distress. (Foskett & Longstaff, 2018).

These statistics are stark when set against the backdrop of the general population where 20.2% of adults in England suffer from a common mental health disorder (NHS digital, 2023-4). This indicates that the presentation in athletes in the UK is more than double that of the general population.

Foskett and Longstaff (2018) conclude that their findings underline the need for more research and understanding of mental health in the elite athlete population in the UK and suggest that more importance needs to be placed on understanding and improving the mental health of elite athletes in the UK. They go on to conclude that the results they found seem to be consistent with the experience of athletes across Western cultures and are supported by research undertaken in other countries using the same measurement tools (Longstaff, & Fockett, 2018).

The issue is not confined to elite athletes. Research concerning the mental health of college athletes in the US has described the issue as a mental health crisis in response to a 50% increase in suicide among the student-athlete population in the past decade: college athletes have always had distinct mental health needs. Student-athletes are likely to struggle with depression, anxiety, eating disorders and substance abuse but they often do not seek help. This sets up a huge problem where athletes are expected to perform at a high level but suffer mentally in silence. (Marina Harris PhD, 2023).

This state of affairs becomes a negative causal nexus as research demonstrates that anxiety diminishes movement during execution as well as gait, balance and mobility. These movement inhibitions are autonomic and as such are outside the conscious control of the athlete, which in turn increases their feelings of frustration, incompetence and desperation, further feeding their distress, anxiety and/or depression. (Causer et al., 2011; Eysenck et al., 2007; Feldman R, et al., 2019; Pijpers, Oudejans, Bakker, 2005; Wilson, Vine, & Wood, 2009a; Wilson, Vine, & Wood, 2009b).

Limitations of Traditional Sport Psycholog and Mental Performance Coaching

There are several labels emerging in the field of sport psychology: sport psychologist, mental performance coach/ consultant, mental skills coach, peak performance coach, etc.

Most Western-based professionals focus almost exclusively on performance and achieving results through working on a *judoka*'s conscious mental strategies and behavioural techniques to guide the *judoka* to relax under pressure. This is achieved using techniques such as:

- changing negative self-talk
- focussing on the task at hand
- mental rehearsals of peak performance
- letting go of mistakes
- quietening the over-active mind.

Primarily, these techniques centre on and engage the left hemisphere of the neocortex, which has the capacity to process 60 bits of sensory information per second. They don't actively engage the subcortex, which is processing 11 million bits of sensory information every second and controls autonomous performance inhibitions, be they movement, body tension or psychological issues.

Through rapid advances in neuroscience, our understanding of the autonomic nervous system (ANS) and the body-brain network has reached new levels. In addition to the relative processing speeds of the neo and subcortices, we now estimate that about 85% of nerves connect from the body up to the brain. This process occurs from the body to the subcortex, then up to the right hemisphere of the neocortex and only then, finally across to the left hemisphere. Only about 15% of the connection is back down from the left hemisphere to the body. This research now gives us a real sense of the limitations of techniques that work almost exclusively with a top-down, neocortex to subcortex and body approach (Porges, 2004).

In addition, these techniques also focus on achieving competition results and rankings with the majority of the attention being placed on mental preparation for competition

with little attention being paid to the *judoka*'s fundamental motivation, states and traits in relation to themselves, their daily life, training, team, coaches, etc. In an interview with 3-time judo Olympic champion Teddy Riner (FRA) shortly before the 2024 Olympics, with Anthony Hernandez (Marrakech special correspondent), published on 2nd August 2024 in the 'Le Monde,' Riner stresses the importance of lifestyle choices, of staying true to one's self and one's values. He states the importance of not being swayed by external influences as well as the importance of a very supportive network of coaches, family and friends.

These cognitively focused interventions, used widely by Western sport psychologists, may well be in contradiction with the concept of '*Mushin'* ('no mind' or 'mind without mind'). Other labels include flow, ego-less movement, fluidity, awareness without conscious thoughts, global awareness, and so on. In other words, they keep athletes attached to thoughts and outcomes as opposed to using interventions aimed at supporting a *judoka*'s access to a state of clarity of mind where actions are carried out without conscious thought.

"If your mind leans in the direction of these thoughts, though you listen you will not hear; and though you look, you will not see. This is because there is something in your mind. What is there is thought. If you are able to remove this thing that is there, your mind will become No Mind, it will function when needed, and will be appropriate to its use" (Soho, 2012 p14)

This implies that the very approaches being used to improve performance are in contradiction to the concept of *Mushin*, one of the core judo teachings on the source of performance. This may be having a detrimental effect on performance, by interfering with the *judoka*'s ability to react instantly to an opponent's movement without deliberate calculation, to flow through a series of techniques and experience the dual attunement of feel and timing; all aspects that are necessary to remain mentally undisturbed in the face of unexpected or sustained attacks.

Deshimaru (1982), when asked how to choose the technique for an attack, argues, "There is no choosing, it happens unconsciously, automatically, naturally. There can be no thought because if there is a thought, there is a time of thought, and that means a flaw. For the right movement to occur, there must be permanent, totally alert awareness of the entire situation; that awareness chooses the right stroke, technique and the body executes it and it's all over." Deshimaru (1992 p31).

Seng (2025, p1) points out that *Mushin* "is sometimes considered to be the summit of martial arts practice."

Stephen Fabian (2001) offers that "The *Mushin* state is when the mind is unruffled, imperturbable, unattached and unfettered. This mastery is achieved through rigorous training and spirit forging (*seishin tanren*, in Japanese) by overcoming one's own fears and weaknesses so that every response is unhesitating and appropriate."

Let us turn back to the lens of the Western scientific paradigm and the long-term consequences of the current approach. The cognitive and results orientation of the predominant model of sport psychology is of some use but fails to account for *judoka* sufficiently, who may be high on the mental performance continuum but low on the mental health continuum (i.e. skilled at the deregulatory processes described below in the Self-Determination Theory and unskilled at the regulatory processes). As a consequence, they have limited impact when it comes to releasing repetitive sport performance problems (RSPPs) and Sport Traumatic Stress Disorder (STSD). These approaches are often driven by the sport industry´s objectification of athletes, in which the *judoka* is a mere asset to fulfil the ambitions and desires of others. The repercussion of this is almost certainly that underlying mental health issues will eventually emerge with a strong negative impact, at which time the *judoka*'s mental performance is likely to partially or completely collapse.

The negative psychological impact of a perceived external locus of control on wellbeing is explained in detail in Self-Determination Theory (SDT). This theory shows that a persistent aspect of human nature is to obtain mastery, be curious, vital, agentic and inspired and that the enhancement of these intrinsic attributes requires specific social environments. It also demonstrates that they can be easily disrupted, diminished and even crushed in non-supportive conditions.

"Comparisons between people whose motivation is authentic (literally, self-authored or endorsed) and those who are merely externally controlled for an action, typically reveal that the former, relative to the latter, have more interest, excitement and confidence, which in turn manifests as enhanced performance, persistence and creativity (Deci & Ryan, 1991; Sheldon, Ryan, Rawsthorne, & Ilardi, 1997), and as heightened vitality (Nix, Ryan, Manly, & Deci, 1999), self-esteem (Deci & Ryan, 1995), and general wellbeing (Ryan, Deci, & Grolnick, 1995). This is so even when the people have the same level of perceived competence or self-efficacy for the activity." (Ryan & Deci, 2000 p.69).

Empirically, SDT has identified three innate psychological needs that, when met, enhance this natural motivation and wellbeing and, when denied, contribute to alienation and illbeing. They are the need for competence (Harter, 1978; White, 1963), autonomy (deCharms, 1968; Deci,

1975) and relatedness (Baumeister & Leary, 1995; Reis, 1994).

Cognitive Evaluation Theory (CET), a sub-theory within SDT, offers a frame for the social and environmental factors that enable rather than diminish intrinsic motivation. Within it, research has shown that optimal challenges, effectance-promoting feedback and freedom from demeaning evaluations developed a sense of perceived competence and as a result enhanced performance (Vallerand & Reid, 1984), whereas negative performance feedback diminished it (Deci, 1975).

This is further supported by the Social Comparison Theory (Festinger, 1945), which explains how people validate themselves through comparison with others who are similar to them. They make two types of comparisons: upward social comparisons or downward social comparisons. With the former, an individual compares themselves to someone who they perceive to be better than them. Research suggests that upward social comparisons can have negative effects on self-esteem (Blanton et al., 2000; Gibbons & Gerrard, 1989). On the other hand, it also suggests that when an individual compares themselves with someone they perceive to be performing less well than them (downward social comparison) it can have a positive effect on self-esteem (Gibbons et al., 1981; Wills, 1981). An intriguing study was conducted along these lines by Medvec, Madley and Gilovich (1995). They coded the facial expressions of medal winners at the 1992 Olympic Games in Barcelona. It showed that the bronze medal winners demonstrated noticeably more satisfaction than the silver medallists. They concluded this was because silver medallists are compelled to make upward comparisons with gold medallists, yet those who won bronze experienced the liberty of making self-esteem enhancing comparisons with the rest of the field who had not won a medal. How often does technical and mental coaching focus exclusively on upward performance comparison?

However, studies within CET have shown that in order to enhance intrinsic motivation, feelings of competence need to be accompanied by an internal perceived locus of control which creates the sense of autonomy (Fisher, 1978; Ryan, 1982). Deci, Koestner, and Ryan (1999) confirmed that all tangible rewards that are conditional on task performance consistently undermine intrinsic motivation, as do threats, time-framed targets, commands, pressured evaluations and imposed tangible rewards, as they create a perceived external locus of control and therefore a sense of loss of autonomy.

An additional sub-theory of SDT is the organismic integration theory (OIT) (Deci & Ryan, 1985). It explains how externally proposed targets, goals, technical and strategic coaching and performance suggestions do not need to stay in the realm of an external locus of control. They can become internalised, absorbed into the athlete´s intrinsic motivation through the relevant regulatory processes of congruence, self-awareness and synthesis with the self. They fail to become so as a result of the following deregulatory processes:

- External regulation: Demand for compliance through offers of external rewards and punishments. Motivation remains completely externalised.

- Introjected regulation: Athlete tries to gain self-control through ego involvement (such as self-talk), internal rewards and punishments. Motivation remains mainly externalised.

- Identified regulation: Athletes boost themselves through a sense of self-importance, self-enhancement and conscious self-valuing. A limited amount of motivation becomes internalised (Ryan & Deci, 2000).

Many of the sport psychology techniques, as mentioned previously, centre on these deregulatory processes in a limited attempt to manage the mental aspect of performance.

A person becomes caught in the cycle of extrinsic motivation so they can fulfil their need or desire to belong to a significant environment or group of people. In the case of the *judoka*, there is a complex relationship between the necessity of belonging to a *dojo* and bu for *manabu* (learning) and *keiko suru* (practice of judo), and the innate need for *kizuna* (relatedness) that drives their connection to coaches and *judoka* they admire. This prompts an externalised idealisation of the behaviours, actions, targets and instruction that are modelled, valued or given by the significant others to whom they feel (or want to feel) attached or related. This suggests that relatedness, the need to feel belonging and connectedness with others, is centrally important for internalisation. OIT offers the insight that internalisation is facilitated when the social environment gives them feelings of relatedness consistently (Ryan & Deci, 2000). Is the knowledge and ability to support the regulatory process of the *judoka*, and therefore the internalisation of the training, through the relationship part of the skill set of coaches?

OIT shows that through authenticity, autonomy and relatedness, the *judoka* is able to engage with external motivations and goals by integrating them with their intrinsic motivation effectively and their innate commitment to mastery. On the other hand, the deregulatory processes mentioned above, which commonly describe the athletic environment, create alienation and inauthenticity, and undermines the primary foundations of mental health. Kasser and Ryan (1993, 1996) found that placing strong relative importance on intrinsic aspirations was positively associated with wellbeing indicators such as self-esteem and self-actualisation, whereas giving strong relative im-

portance to extrinsic aspirations was negatively related to these wellbeing indicators and strongly associated with depression and anxiety. These findings have been replicated in a Russian sample, suggesting a generalisability across cultures (Ryan, Chirkov, Little, Sheldon, Timoshina, and Deci (1999). This could explain the significant commonality of mental health conditions, such as anxiety and depression, in the athlete population, as described previously.

Therefore, our proposition is that traditional sport psychology is founded on some of the key drivers of performance inhibition and mental illbeing. Consequently, they attempt to develop high-level mental performance, which may bring partial and temporary relief to the *judoka*, but they do so using the very processes that diminish mental health. One example is mental toughness, often explained to and internalised by the *judoka* as "I need to be mentally stronger," "I need to try harder," as a way of compensating for or overriding deep-seated doubts, insecurities and issues of motivation. Above we defined this as the introjected deregulating process. Another example is the core question of the traditional diagnostic approach, "What is wrong with you?" This focus strengthens self-doubt, diminishes feelings of competence and damages key relationships. It assumes a dispositional (a person's inherent qualities of mind and character) attribution for the cause of their difficulty, when the attribution is more likely to be situational, as a consequence of an environment that disrupts, diminishes and even crushes their intrinsic human attributes (Weiner, 1985, 1986).

Later in this article the Free to Perform approach will be presented, to offer a way of engaging with the *judoka* as a whole person. It engages their whole brain and nervous system, both the neocortical and subcortical processes that enhance their sense of competence, autonomy and relatedness. It thereby enables them to internalise their athletic training and development with their intrinsic motivation so that their innate excitement, vitality and confidence are the driving forces to achieve mastery and well-being. When they face a difficulty, the core question, rather than being "what is wrong with you?" should be "What are you experiencing?" and this is explored both neo- and subcortically. It focusses on interoceptive and proprioceptive awareness of precision and high-level skills that are already embedded in the brain-body network to strengthen the sense of competence and success in practice. It enhances performance by developing the same level of awareness to refine and incorporate new skills that take the *judoka* to their next level of performance. Thereby, it trains the mind to release external goals and comparisons and to redirect its attention to the internal locus of control of an effectance-promoting evaluation of their abilities and the development of a realistic training programme that will give them the maximum enhancement of their abilities. This level of interoceptive and proprioceptive awareness embeds their attention into the brain-body network which maximises their trust in the body and its performance, even under pressure.

The Deep-Seated Causes of Performance Inhibitions

The natural state of our nervous system is to feel safe, secure and solid. However, some people have had life experiences that whittled this away, leaving their nervous system in a state of insecurity. This presents itself psychologically as well as in physical dissociation, body tension and movement inhibitions (Amen et al., 2015).

A general term for such life experiences is 'adverse events,' which include:

- Inadequate attachment, attunement and bonding in early life
- Disorder in the family life, such as divorce, illness or mental health difficulties within the family
- Traumatic events
- Injuries
- Continuous adverse events such as bullying and training with an oppressive coach (Faulx et al., 2011)

In all these cases, internally, the person is perceiving an insecurity or threat they do not have the capacity to resolve. Their internal systems reorganise to re-establish homeostasis in relation to the external disorder and therefore, what feels familiar and normal is, in reality, internal disorder. This is, in effect, the trauma response. Psychiatrist and trauma specialist Bessel van der Kolk suggests that traumatisation occurs when both internal and external resources are inadequate to cope with the external threat (Van der Kolk, 2015).

Research suggests an extraordinarily high incidence of adverse childhood experiences in elite athletes. In a 2017 study led by sport psychology professor Lew Hardy in the United Kingdom, 32 former Great Britain athletes from Olympic sports and 16 super-elite athletes who had won several medals at major championships were studied. All of them had been exposed to trauma as children, where this was not the case with non-medallists. This suggests that adverse events give access to extraordinary achievements. However, simultaneously it leaves the athlete highly vulnerable to mental illbeing.

There is substantial research on the effect of adverse childhood experiences on mental and physical health and the results have been unequivocal. Emerging research in the USA (Journal of Issues in Intercollegiate Athletics) has highlighted a link between adverse childhood experiences (ACEs) and various health concerns experienced

by National College Association student-athletes. They include injury/physical health concerns, anxiety, depression, stress, and substance abuse.

Latent vulnerability is the unseen link between childhood trauma and mental health problems arising later, emotionally and biologically. Scientists have identified changes in the threat, reward and memory systems in the brains of these children and a loss of a natural sense of goodness, especially concerning “I am good.” (*UK Trauma Council*)

Collectively, this research concludes that adverse events create a focus on and access to a number of natural human gifts that are necessary to unleash full potential. At the same time, it leaves elite athletes with a very high latent vulnerability, which simultaneously puts a glass ceiling on their performance. In too many cases it even stops them in their tracks through burnout, mental health issues or movement disorders that prevent them from even being able to continue competing.

In other words, predominantly from very early in an elite athlete´s life history, they will have experienced an environment that disrupted their natural and intrinsic motivation to mastery. Research suggests that it is this exact environment that drove them to seek solace in an extraordinary number of hours of practice. (Arayici & Sutcu, 2025).

Let us couple this with substantial research that shows elite performers are made and not born with innate genius. (The Cambridge Handbook of Expertise and Expert Performance) Therefore, our challenge is to support the *judoka* so they can fully draw on the gifts their adverse life experiences have liberated and at the same time enable them to re-establish a base of inner security, stability and internal order along with the intrinsic motivation that will protect them from the negative impacts that will otherwise be likely to manifest.

At the surface level it appears that in adults, most cognitive and emotional self-regulation is carried out by the attentional executive function of the brain, the area of the brain that the cognitive behavioural approach dominating sport psychology aims to influence. However, it has been shown that children control their stress from their orientation system, particularly by orientating to their mother, but also to other key carers and calming objects of attention.

Self-regulation has been related to regulation of emotions, delay of gratification, discipline, compliance, moral development, social competence, empathy, adaptability and cognitive and academic performance. A key concept is Effortful Control (a temperamental self-regulatory capacity that allows a person to inhibit a dominant response voluntarily, to execute a less dominant, goal-directed response). (Rueda, Posner, & Rothbart, 2011)

Posner, Rothbart, Sheese, Voelker (2012) propose that during infancy self-regulation depends primarily on a brain network involved in orientating to sensory events and is present from 3 months. By 3-4 years, the function of executive attention has developed and the regulatory processes switch to it. Their findings show the importance of orientating to regulate both positive and negative emotions in early development and that it is the developing connectivity of the orientation system that develops the later effectiveness of the executive function.

However, while executive attention becomes independent from the orientation system of the brain eventually, control of distress by orientating is present into adulthood. This means that, the amygdala response in adults is diminished, by instructions that involve both brain areas, those related to orientation and to the executive function. In fact, orientating is necessary in recruiting the executive attentional network in the act of self-regulation (Posner, Rothbart, Sheese, Voelker, 2012).

Research indicates that the development of self-regulation and exercising of the executive systems in children occurs when the cultural environment and/or adults actively offer stimuli that exercise the orientation network in children. As such, parents play an important role in shaping the child´s behavioural and emotional regulation, including effortful control, independent of their genetic tendencies (Bakersman-Krannenberg & van Ijzendoorn, 2006; Bakersman-Krannenberg, van Ijzendoorn, Pijlman, Mesman, & Juffer, 2008; Posner, Rothbart, Sheese, Voelker, 2012; Rothbart, 2011; Rothbart & Rueda, 2005). For example, a study by Bernier, Carlson and Whipple (2010) shows that maternal sensitivity, mindfulness and autonomy-support are related to children´s later executive functions. It also means that when the child does not receive this necessary emotional support and physical stimuli the orientation system does not develop effectively and, as a consequence, the capacity for self-regulation is limited. As a side note, we propose that obsessiveness towards training that leads to injuries from overtraining is a presentation of a lack of self-regulation.

Executive and orientational attention can be directed externally, through locating and selecting objects in order to carry out a desired action and is dominated by visual attention (Hirst, Cragg & Allen, 2018). The same systems are engaged for internal attention; to co-ordinate memories, (procedural, habitual, semantic and episodic (Teyler & DiScenna, 1987), thoughts and emotions (Rueda, Posner, & Rothbart, 2011). In other words, the eyes search for orientational external positions to access these intrinsic experiences. Our hypotheses include the recruitment of these eye positions as a method for internalising externally proposed goals as well as technical and strategic coaching, using the regulated process of the Organismic Integration Theory.

In fact, neuroimaging studies have suggested that the regulatory effects of attention apply just as well to brain areas involved in processing the semantics of words, storing information in memory, and generating emotions such as fear and sadness (Posner & Raichle, 1994, 1998).

This draws a picture where we see that cognitive behavioural approaches are unable to engage the orientation system that is necessary to engage the executive attention that they wish to work with. These limitations are experienced when working with *judoka* who were not able to develop the neurological foundations of self-regulation effectively in their formative environment. However, the brain is extraordinarily plastic and training programmes result in improved executive control in both children and adults. (Moore Sohlberg, McLaughlin, Pavese, Heidrich, & Posner, 2000). However, studies suggest that the effects of self-regulation training may depend on first establishing a minimum level of orienting capacities (Sturm, Willmes, Orgass, & Hartje, 1997). This has been shown to not only positively affect self-regulation but specifically when conflict resolution is necessary and has been shown to increase overall IQ. (Rueda, Rothbart, McCandliss, Saccamono, & Posner, 2005). This was highlighted in the 2015 study by the AMEN Clinic, published in *PLOS* One, showing through SPECT scans that people who had experienced diverse forms of adverse events showed significant alterations in various regions of the brain that present themselves particularly when under pressure, in:

- How emotions are experienced and managed
- Fine motor co-ordination
- Body-brain connection
- Body tensions
- Mental clarity
- Relational difficulties (Amen et al., 2015).

Therefore, this collection of research points us to concluding that the majority of elite *judoka* have incorporated and normalised dysregulation in their motivation, coaching and team relations, their relationship to self, body-brain connection and fine-motor skills, as well as emotional and cognitive wellbeing.

A New Framework

Free to Perform, developed by Ruth S.L. Chiles, draws on both Western science and Eastern wisdom to create a robust conceptual framework hypothesis. It offers a foundation for elite performance and works with a regulatory paradigm founded in the Social Determination, Cognitive Evaluation and Organismic Integration Theories, alongside Michael Posner´s extensive research into the involvement of the orientation and executive functions of attention. It proposes a framework through which *judoka* can release their adaptations that developed in response to adverse events, those that inhibit mental and physical wellbeing and *Mushin*.

It includes strengthening the orientation and executive function through interoceptive and proprioceptive awareness of the centre of gravity and vertical axis of the body. Thereby enabling the *judoka* to:

- Develop self-awareness and a sense of self-congruence.
- Internalise their relationships to others in a way that is congruent and in synthesis with the self.
- Become aware of how their adaptations create imbalances in their emotions, thoughts, body and ability to orientate.
- Internalise technical and strategic skills and synthesise them with the self and with current skill levels.
- Automate precise procedural memory of gross and fine motor skills necessary for excellent technical execution in combat

Deep-Seated Solutions

Within the Free to Perform programme, each *judoka* takes their own unique and personal journey to realising their uninhibited potential. It takes them through four overlapping stages:

1. Attunement Repair

As we have already seen, a *judoka* experiencing performance inhibitions is likely to have experienced a significant number of adverse events which not only create mental health challenges, but also dissociation from the body through inhibition of the body-brain connection. A necessary prerequisite for them to be able to reclaim their performance potential is to recover their interoceptive sensitivity to their internal physical and psychological experiences.

2. Strengthen the Orientation System to Enable Flow

By developing their interoceptive awareness of the centre of gravity and vertical axis of their body, the *judoka* strengthens their orientation system. It is then further enhanced using the orientational eye positions it generates to consciously engage the executive function as well. This strengthens their awareness and deepens and automates their experience. As a result, the *judoka* develops a profound sense of physical, mental and emotional balance, co-ordination and orientation. Following this, they use the

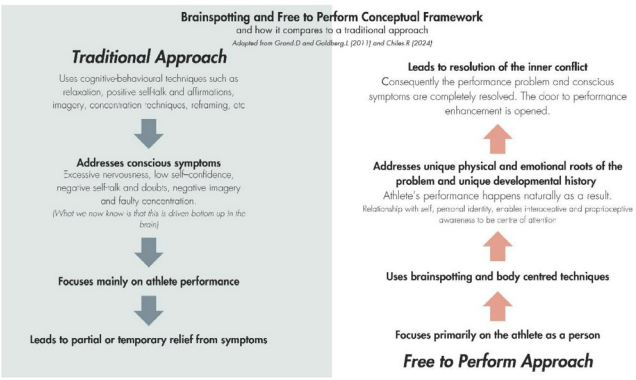
orientational eye positions to explore and release physical, mental and emotional tensions. Thereby, the body, mind and emotions become stable and simultaneously fluid, facilitating a natural sense of *Mushin*, which with practice becomes their default state.

3. Release Adaptations and Return to the Innate Drive for Mastery

The internal experience of *Mushin* feels completely different from the physical and psychological sensations of their adaptations. This gives the *judoka* a clear perspective on their unique dysregulated and, therefore, adaptive patterns and how they negatively affect them. The orientational eye positions create a regulatory rewiring of the brain so that it no longer leans towards the adapted responses. They also engage the executive function to give themselves agency to respond rather than react and to make choices that are congruent with the self.

4. Wire Flow into the Judo

The final stage is to embed the state of *Mushin* into the technical skills and movements they execute during combat. This can be done by ensuring that the *judoka* is precisely orientated in *Mushin* as they train and perfect their technical skills. They use their interoceptive, exteroceptive and proprioceptive awareness to establish the orientational eye positions of precise procedural memory of established technical skills and strategies, down to the finest details. They use the same process to embed new techniques into their procedural memory in a way that is congruent to them. In addition, from *Mushin*, using orientational eye positions, *judoka* can be taught how to move between different aspects of the nervous system seamlessly, as described by Stephen Porges (2004). As a result, they develop access to different parts of the sympathetic and parasympathetic nervous systems. This is not a natural function and needs to be learned and trained. This creates a range of high-performance states within *Mushin* that we call intertwined states. In other words, *Mushin* is not a singular experience, rather it is made up of distinct sub-states, needed for attack (*Kogeki*), defence (*Bogyo /Bougyo*) and transition (*Ikou*).



In the spirit of good research (Giner-Sorolla, Amodio, & van Kleef, 2018), we are publishing our framework whilst it is still a hypothesis, ahead of our research studies. However, early indications of its positive impacts are seen in the informal feedback given by *judoka* who are using it:

"*It has impacted my performance massively, especially through tough periods when doubts are high. Martin has helped so much in managing my expectations, dealing with anxiety and attuning my body. The work we have done recently [using the Free to Perform programme] has been especially helpful at bringing my thoughts in line with my body. I couldn't recommend Martin more for anyone looking to bring sport performance to another level.*"

—Ethan Nairne, British judo champion

"*I've gained a deeper awareness of the key aspects of myself that support my sport and life outside of it. The simple reattunement exercises [included in the Free to Perform programme] we've practised have been incredibly effective, especially during busy periods balancing university and training. Martin has also helped me refine my visualisation and [orientational eye positions] expansion techniques, which I now see as essential to my performance and growth.*"

—Tatum Keen, British judo champion

"*I have become more connected with my mind and use of techniques to unblock my full potential of performance when competing in the European Judo Union Adaptive Judo competition circuit. Most recently, I fought in Venray, Netherlands and earned my best result…, which allowed me to unlock my full potential and fight at my best.*"

—Rowan Kinsella, member of the British Judo adaptive squad

"*It is different for everyone how we perceive injuries, and [it] has helped me to understand my traumatic experiences and taught me ways to process them psychologically in my own way. His empathetic understanding of my experiences has helped me understand the emotional process of an injury much clearer. The sessions have helped me properly digest the real-life experiences/traumas of concussions, surgery rehab and time away from my sport. Having someone to help process the psychological side of my injuries has made a big difference as I am usually left to deal with it myself.*"

—Alexander Salmon, British *judoka*

Other comments from *judoka* following the programme include, "It's like having a superpower," and "Thank you for helping me and giving my confidence back after so many years, can't wait to do more."

We see our work as being directed to *judoka* to give them agency over their performance inhibitions and the ability to create performance expansion. However, we are equally focused on supporting coaches to enable them to understand the impact of their relationship with the *judoka*. We teach them how to be athlete-centred in their approach to enable the *judoka* they coach to develop a sense of competence, autonomy and belonging. As a result, they no longer negatively reinforce the attachment wounds of the athlete but rather become a force of wellbeing and liberation of potential.

Elliot Newell (Sport Performance Coach and Sport Psychologist), when considering using Attachment Theory to understand athletes better, has written, "The most effective coach-athlete relationships have been shown to involve characteristics such as empathic understanding, honesty, support, liking, acceptance, responsiveness, friendliness, co-operation, caring, respect and positive regard. Of paramount importance to any relationship is trust; particularly relating to the trust each member has in the other's ability to meet their needs" (Jowett, 2005) (Jowett & Meek, 2000).

He goes on to suggest, "Coaches seeking to enhance the quality of the relationships they have with their athletes may benefit from developing an understanding of how their athletes perceive trust in their relationships. A tried and tested theory from mainstream psychology, known as 'Attachment Theory,' may provide a useful framework to achieve this" (Newell, 2015).

This concept supports a humanist approach embedded in the principles of athlete-centred coaching and is promoted in various judo literature. In The Science of Judo (2018, chapter 10. p99), Darren Warren discusses the importance of athlete-centred coaching and the importance of taking this humanist approach to enable a *judoka* to develop and evolve.

Conclusion

Rapid advancement in the understanding and application of neuroscience, neurophysiology and neuroplasticity has illuminated the limitations inherent in the cognitive and behavioural approaches traditionally utilised in sport performance psychology.

There is now undeniable evidence that negative early life attachments and subsequent negative life experiences can be a major underlying factor in sport performance problems, which the current approaches can only partially or temporarily address.

If the rapidly growing body of evidence supporting the arguments and methods put forward in this article are accepted and embraced, a different and fertile landscape for working with performance issues comes into sharp relief, allowing the new paradigm to take root and flourish. This could offer the opportunity to become an exciting and beneficial way of working with *judoka* and coaches at all levels, where underlying causes of performance difficulties can be reconciled effectively and equal importance can be placed on maintaining equilibrium between the mental health and mental performance continuums.

Using the exercises offered in the Free to Perform framework, performance coaches can work with *judoka* to resolve the internal adaptations that developed and negatively affect an athlete's ability to enter and remain in *Mushin*, free of self-doubt, self-criticism and fear, thus expanding the parameters of performance potential available for each *judoka*.

The Free to Perform Framework hypothesis detailed herein also offers a well-researched and structured programme combining these components and principles in which *judoka*, mental performance coaches and judo coaches can work collaboratively to create a truly humanist, athlete-centred approach.

Although early into the programme, the *judoka* currently involved are already noticing and reporting significant benefits in their training, ability to cope with other life stressors and in their focus and the quality of their performances.

REFERENCES

Amen, D. G., Raji, C. A., Willeumier, K., Taylor, D., Tarzwell, R., Newberg, A., et al. (2015). Functional neuroimaging distinguishes posttraumatic stress disorder from traumatic brain injury in focused and large community datasets. *PLOS ONE, 10*(7), e0129659. https://doi.org/10.1371/journal.pone.0129659

Arayici, & Sutcu. (2025). The relationship between childhood trauma, exercise addiction, emotion regulation difficulties, and basic psychological needs in Türkiye. *Journal of Clinical Sport Psychology*. https://doi.org/10.1123/jcsp.2023-0036

Auerbach, A., & Stokowski, S. (2020). *Special issue editors' note: Mental health and college athlete well-being. Journal of Issues in Intercollegiate Athletics, 13*(3), Article 5. https://scholarcommons.sc.edu/jiia/vol13/iss3/5

Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Pijlman, F. T. A., Mesman, J., & Juffer, F. (2008). Experimental evidence for differential susceptibility: Dopamine D4 receptor polymorphism (DRD4 VNTR) moderates intervention effects on toddlers' externalizing behavior in a randomized controlled trial. *Developmental Psy-*

chology, 44(1), 293–300. https://doi.org/10.1037/0012-1649.44.1.293

Bernier, A., Carlson, S. M., & Whipple, N. (2010). From external regulation to self-regulation: Early parenting precursors of young children's executive functioning. *Child Development, 81*(1), 326–339. https://doi.org/10.1111/j.1467-8624.2009.01397.x

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497–529. https://doi.org/10.1037/0033-2909.117.3.497

Baumeister, R. F., & Tierney, J. (2012). *Willpower: Rediscovering the greatest human strength*. Penguin Books.

Blanton, H., Crocker, J., & Miller, D. T. (2000). The effects of in-group versus out-group social comparison on self-esteem in the context of a negative stereotype. *Journal of Experimental Social Psychology, 36*(5), 519–530.

Callan, M. (Ed.). (2018). *The science of judo* (Routledge Research in Sport and Exercise Science; 1st ed.). Routledge.

Causer, J., Holmes, P. S., Smith, N. C., & Williams, A. M. (2011). *Anxiety, movement kinematics, and visual attention in elite-level performers. Emotion, 11*(3), 595–602. https://doi.org/10.1037/a0023225

Chiles, R. S. L. (2024). *Free to perform. August 16*, 2024.

Ciaccioni, S., et al. (2023). Martial arts, combat sports, and mental health in adults: *A systematic review. Psychology of Sport and Exercise*. https://doi.org/10.1016/j.psychsport.2023.102556

Coan, J. A., Schaefer, H. S., & Davidson, R. J. (2006). Lending a hand: Social regulation of the neural response to threat. *Psychological Science, 17*(12), 1032–1039. https://doi.org/10.1111/j.1467-9280.2006.01832.x

Corrigan, F., & Grand, D. (2013). Brainspotting: Recruiting the midbrain for accessing and healing sensorimotor memories of traumatic activation. *Medical Hypotheses, 80*(6), 759–766. https://doi.org/10.1016/j.mehy.2013.03.005

Deshimaru, T. (1992). *The Zen way to martial arts*. Penguin Compass.

deCharms, R. (1968). *Personal causation*. Academic Press.

Deci, E. L. (1975). *Intrinsic motivation*. Plenum.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*(6), 627–668. https://doi.org/10.1037/0033-2909.125.6.627

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum.

Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Nebraska Symposium on Motivation: Vol. 38*. Perspectives on motivation (pp. 237–288). University of Nebraska Press.

Deci, E. L., & Ryan, R. M. (1995). Human autonomy: The basis for true self-esteem. In M. Kernis (Ed.), *Efficacy, agency, and self-esteem* (pp. 31–49). Plenum.

Ericsson, K. A., Charness, N., Feltovich, P. J., & Hoffman, R. R. (Eds.). (2006). *The Cambridge handbook of expertise and expert performance. Cambridge University Press.*

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). *Anxiety and cognitive performance: Attentional control theory. Emotion, 7*(2), 336–353.

Fabian, S. (2001). Fudoshin and its continuing relevance. *Furyu: The Budo Journal*, (9).

Faulx, D., Baldwin, J., Zorrah, Q., Langlois, D., & McKenzie, L. (2011). Adverse childhood events in the mental health discussion. *American Journal of Public Health, 101*(7), 1156–1157. https://doi.org/10.2105/AJPH.2011.300207

Feldman, R., Schreiber, S., Pick, C. G., & Been, E. (2019). Gait, balance, mobility and muscle strength in people with anxiety compared to healthy individuals. *Human Movement Science, 67*, Article 102513. https://doi.org/10.1016/j.humov.2019.102513

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117–140. https://doi.org/10.1177/001872675400700202

Fisher, C. D. (1978). The effects of personal control, competence, and extrinsic reward systems on intrinsic motivation. *Organizational Behavior and Human Performance, 21*(3), 273–288. https://doi.org/10.1016/0030-5073(78)90054-5

Foskett, R., & Longstaff, F. (2018). The mental health of elite athletes in the United Kingdom. *Journal of Science and Medicine in Sport, 21*(8), 765–770. https://doi.org/10.1016/j.jsams.2017.11.016

Gibbons, F. X., & Gerrard, M. (1989). Effects of upward and downward social comparison on mood states. *Journal of Social and Clinical Psychology, 8*(1), 14–31. https://doi.org/10.1521/jscp.1989.8.1.14

Giner-Sorolla, R., Amodio, D. M., & van Kleef, G. A. (2018). Three strong moves to improve research and replications alike. *Behavioral and Brain Sciences, 41*, Article e130. https://doi.org/10.1017/S0140525X18000651

Gouttebarge, V., Castaldelli-Maia, J. M., Gorczynski, P., Hainline, B., Hitchcock, M. E., Kerkhoffs, G. M., Rice, S. M., & Reardon, C. L. (2019). Occurrence of mental health symptoms and disorders in current and former elite athletes: A systematic review and meta-analysis. *British Journal of Sports Medicine, 53*(11), 700–706. https://doi.org/10.1136/bjsports-2019-100671

Grand, D., & Goldberg, D. (2011). This is your brain on sports: Beating blocks, slumps and performance anxiety for good! Dog Ear Publishing.

Harris, M. (2023, July 5). College student-athletes are dying in mental health crisis: A call for change. *Psychology Today*. https://www.psychologytoday.com/us/blog/letters-from-your-therapist/202212/college-student-athletes-are-dying-in-mental-health-crisis

Hardy, L., Barlow, M., Evans, L., Rees, T., Woodman, T., & Warr, C. (2017). Great British medalists: Psychosocial biographies of super-elite and elite athletes from Olympic sports. *Progress in Brain Research, 232*, 1–119. https://doi.org/10.1016/bs.pbr.2017.03.004

Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. *Human Development, 21*(1), 34–64. https://doi.org/10.1159/000271574

Hirst, R. J., Cragg, L., & Allen, H. A. (2018). Vision dominates audition in adults but not children: A meta-analysis of the Colavita effect. *Neuroscience & Biobehavioral Reviews*. https://doi.org/10.1016/j.neubiorev.2018.07.012

Jowett, S., & Cockerill, I. M. (2003). Olympic medallists' perspective of the athlete–coach relationship. *Psychology of Sport and Exercise, 4*(4), 313–331. https://doi.org/10.1016/S1469-0292(02)00011-0

Jowett, S., & Meek, G. A. (2000). The coach–athlete relationship in married couples: An exploratory content analysis. *The Sport Psychologist, 14*(2), 157–175. https://doi.org/10.1123/tsp.14.2.157

Kim, H.-Y., Chung, E.-J., Kim, S.-W., & Lee, B.-H. (2022). Effect of judo athletes' psychological function on sports coping skills: Moderated mediating effect of tension. *International Journal of Environmental Research and Public Health, 19*(11), 6634. https://doi.org/10.3390/ijerph19116634

Kasser, T., & Ryan, R. M. (in press). Be careful what you wish for: Optimal functioning and the relative attainment of intrinsic and extrinsic goals. In P. Schmuck & K. M. Sheldon (Eds.), *Life goals and well-being*. Pabst Science.

Lopez-Lopez, A., et al. (2020). Psychological factors influencing performance in judo: A review of the literature. *Journal of Sport Sciences*. (Note: Volume and page numbers were not provided; include if available.)

Medvec, V. H., Madey, S. F., & Gilovich, T. (1995). When less is more: Counterfactual thinking and satisfaction among Olympic medalists. *Journal of Personality and Social Psychology, 69*(4), 603–610. https://doi.org/10.1037/0022-3514.69.4.603

Moore Sohlberg, M., McLaughlin, K. A., Pavese, A., Heidrich, A., & Posner, M. I. (2000). Evaluation of attention process training and brain injury education in persons with acquired brain injury. *Journal of Clinical and Experimental Neuropsychology, 22*(5), 656–676. https://doi.org/10.1076/1380-3395(200010)22:5;1-9;FT656

Müller, F., Borger, K. A., Kellermann, C. M., Wellnitz, M., & Cañal-Bruland, R. (2021). The relationship of motive disposition and situational incentives to individual differences in choking under pressure. *Human Movement Science, 78*, 102831. https://doi.org/10.1016/j.humov.2021.102831

Newell, E. (2015). Using attachment theory to better understand your athlete. *Believe Perform*. https://members.believeperform.com/using-attachment-theory-to-better-understand-your-athletes/

Newton-Sandy Hook Community Foundation, Inc. (2016, September). *Report of findings from the community survey*. http://www.nshcf.org/wp-content/uploads/2016/09/2016-NSHCF-Community-Assessment-Report.pdf

NHS Digital. (2023–2024). Adult psychiatric morbidity survey: *Survey of mental health and wellbeing,* England 2023/4 – Common mental health conditions. https://digital.nhs.uk/data-and-information/publications/statistical/adult-psychiatric-morbidity-survey

Nix, G. A., Ryan, R. M., Manly, J. B., & Deci, E. L. (1999). Revitalization through self-regulation: The effects of autonomous and controlled motivation on happiness and vitality. *Journal of Experimental Social Psychology, 35*(3), 266–284. https://doi.org/10.1006/jesp.1999.1382

Paglia, M. (2020, September 14). Brainspotting therapy explained: *How brainspotting makes you feel*. (Web article).

Pijpers, J. R., Oudejans, R. R., & Bakker, F. C. (2005). Anxiety-induced changes in movement behaviour during the execution of a complex whole-body task. *Quarterly Journal of Experimental Psychology, 58*(3), 421–445. https://doi.org/10.1080/02724980343000945

Posner, M. I., & Raichle, M. E. (1994). *Images of mind*. Scientific American Books.

Posner, M. I., & Raichle, M. E. (1998). The neuroimaging of human brain function. *Proceedings of the National Academy of Sciences, 95*(3), 763–764. https://doi.org/10.1073/pnas.95.3.763

Posner, M. I., Rothbart, M. K., Sheese, B. E., & Voelker, P. (2012). Control networks and neuromodulators of early development. *Developmental Psychology, 48*(3), 827–835. https://doi.org/10.1037/a0025530

Porges, S. W. (2004). Neuroception: A subconscious system for detecting threats and safety. *Zero to Three Journal, 24*(5).

Reis, H. T. (1994). Domains of experience: Investigating relationship processes from three perspectives. In R. Erber & R. Gilmour (Eds.), *Theoretical frameworks for personal relationships* (pp. 87–110). Erlbaum.

Rossi, C., Roklicer, R., Tubic, T., Bianco, A., Gentile, A., Manojlovic, M., Maksimovic, N., Trivic, T., & Drid, P. (2022). The role of psychological factors in judo: A systematic review. *International Journal of Environmental Research and Public Health, 19*(4), 2093. https://doi.org/10.3390/ijerph19042093

Rothbart, M. K. (2011). Becoming who we are: Temperament, personality and development. Guilford Press.

Rothbart, M. K., & Rueda, M. R. (2005). The development of effortful control. In U. Mayr, E. Awh, & S. W. Keele (Eds.), *Developing individuality in the human brain: A tribute to Michael I. Posner* (pp. 167–188). American Psychological Association.

Rueda, M. R., Posner, M. I., & Rothbart, M. K. (2005). The development of executive attention: Contributions to the emergence of self-regulation. *Developmental Neuropsychology, 28*(2), 573–594. https://doi.org/10.1207/s15326942dn2802_2

Rueda, M. R., Rothbart, M. K., McCandliss, B. D., Saccomanno, L., & Posner, M. I. (2005). Training, maturation, and genetic influences on the development of executive attention. *Proceedings of the National Academy of Sciences, 102*(41), 14931–14936. https://doi.org/10.1073/pnas.0506897102

Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology, 43*(3), 450–461. https://doi.org/10.1037/0022-3514.43.3.450

Ryan, R. M., Chirkov, V. I., Little, T. D., Sheldon, K. M., Timoshina, E., & Deci, E. L. (1999). The American Dream in Russia: Extrinsic aspirations and well-being in two cultures. *Personality & Social Psychology Bulletin, 25*(12), 1509–1524. https://doi.org/10.1177/01461672992510007

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., Deci, E. L., & Grolnick, W. S. (1995). Autonomy, relatedness, and the self: Their relation to development and psychopathology. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology: Theory and methods* (pp. 618–655). Wiley.

Seng, L. (2021). *Mushin* in martial arts and insights from neuroscience. *International Journal of Martial Arts, 7*, 1–9. https://doi.org/10.51222/injoma.2021.03.7.1

Soho, T. (2012). The unfettered mind. Shambhala Publications.

Schore, A. N. (2015). Affect regulation and the origin of self: The neurobiology of emotional development. Routledge.

Sheldon, K. M., Ryan, R. M., Rawsthorne, L. J., & Ilardi, B. (1997). Trait self and true self: Cross-role variation in the Big-Five personality traits and its relations with psychological authenticity and subjective well-being. *Journal of Personality and Social Psychology, 73*(6), 1380–1393. https://doi.org/10.1037/0022-3514.73.6.1380

Sturm, W., Willmes, K., Orgass, B., & Hartje, W. (1997). Do specific attention deficits need specific training? *Neuropsychological Rehabilitation, 7*(2), 81–103. https://doi.org/10.1080/713755526

Teyler, T. J., & DiScenna, P. (1987). Long-term potentiation. *Annual Review of Neuroscience, 10*, 131–161. https://doi.org/10.1146/annurev.ne.10.030187.001023

UK Trauma Council. (n.d.). How latent vulnerability plays out over a child's life. https://uktraumacouncil.org/resource/how-latent-vulnerability-plays-out-over-a-childs-life

Vallerand, R. J., & Reid, G. (1984). On the causal effects of perceived competence on intrinsic motivation: A test of cognitive evaluation theory. *Journal of Sport Psychology, 6*(1), 94–102. https://doi.org/10.1123/jsp.6.1.94

Van der Kolk, B. A. (2015). The body keeps the score: Mind, brain and body in the transformation of trauma. Penguin Books.

Warren, D. (2018). *The science of judo* (Chapter 10, p. 99).

Weiner, B. (1985). “Spontaneous” causal thinking. Psychological *Bulletin, 97*(1), 74–84. https://doi.org/10.1037/0033-2909.97.1.74

Weiner, B. (1986). An attributional theory of motivation and emotion. Springer.

Wills, T. A. (1981). Downward comparison principles in social psychology. *Psychological Bulletin, 90*(2), 245–271. https://doi.org/10.1037/0033-2909.90.2.245

Wilson, M., Vine, S. J., & Wood, G. (2009a). The influence of anxiety on visual attentional control in basketball free throw shooting. *Journal of Sport & Exercise Psychology, 31*, 152–168.

Wilson, M., Wood, G., & Vine, S. J. (2009b). Anxiety, attentional control, and performance impairment in penalty kicks. *Journal of Sport & Exercise Psychology, 31*, 761–775.

Ziv, G., & Lidor, R. (2013). Psychological preparation of competitive judokas: A review. *Journal of Sports Science & Medicine, 12*(3), 371–380.

Article history:
Received: 02 April, 2025
Accepted: 06 November, 2025W. (1963).

The Influence of Refereeing Rules, Techniques and Tactics on Judo Fighting Styles: A Narrative Review

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Abstract: *This narrative study aimed to clarify the concept of fighting styles in judo, examine the influence of rule changes on combat attitudes, analyse the role of technical preferences in differentiating styles, and evaluate how tactical approaches, often shaped by regulatory constraints, affect the dynamics of combat. Judo is a sport of considerable complexity. Multiple interdependent factors, among which style plays a critical role by shaping technical and tactical behaviours, determined its performance. However, despite its significance, specific research on fighting style in judo is limited and necessitates a comprehensive narrative synthesis. To address this gap, the literature review synthesised various theoretical perspectives and empirical studies from both judo and other combat sports to develop a comprehensive framework for understanding stylistic development. Several interconnected factors shape fighting style in judo, including specific grips, preferred throws, groundwork techniques, the tactical choices athletes make during contests, and the influence of evolving rules. A deeper understanding of style and its impact on performance is crucial for coaches and athletes in designing effective training programmes and competitive strategies. This multidimensional analysis underscores the importance of adopting an integrated, individualised approach to cultivate each judoka's unique fighting style.*

Keywords: *judo, fighting style, rule changes, technical preferences, tactical approaches, sport performance, combat sports.*

No-one predicted the international evolution of judo, including Jigoro Kano himself. While he envisioned judo spread as a moral and educational tool, he did not foresee how competitive and cultural adaptations would alter its original framework (Kano, 1986). The globalisation of judo through its appropriation and adaptation to diverse cultural and physical contexts has generated local variations that have transformed worldwide practice significantly (Hilpron & Rosselin, 2010). Haruki Uemura, president of the Kodokan, has acknowledged that as judo becomes part of the global culture, inevitably it loses its Japanese cultural specificity and distinctive appeal (Ogawa, 2009).

On 2nd December 1961, Anton Geesink won the All Categories World Championship final against the defending champion Koji Sone in Paris. This victory was a critical point in judo history. By defeating this *judoka*, Geesink disrupted Japan's dominance, introducing the possibility that excellence in judo does not require national affiliation (Takahashi et al., 2005). Additionally, his triumph at the 1964 Tokyo Olympics showed that the sportification of judo, through its rules standardisation and internationalisation of competition, could lead to a loss of national exclusivity in sporting excellence. Consequently, distinct national schools and styles emerged, with athletes challenging Japan's long-standing supremacy in judo. Countries, such as Georgia, Russia, France, South Korea, Brazil, Cuba, Iran, and others, have secured world and Olympic titles (Marionda et al., 2023; Bagińska et al., 2022; Holden, 2012; Adam et al., 2011, 2013c). Characterised by specific approaches to preparation and training, each country showcases a unique competitive style that often combines elements from two primary approaches: traditional Kodokan judo and sambo, especially in their throwing techniques (Sacripanti, 2013a). The geographical distribution of prominent judo schools highlights a diversity of judo styles. Dimitrova (2020) identified the leading judo schools across several regions: Asia (Japan and South Korea), Eastern Europe (Russia, Georgia and Azerbaijan), former USSR countries (Uzbekistan and Kazakhstan), Western Europe (France, Germany, Italy, and Spain), and Central Europe (Poland, Hungary, Romania, and Slovenia). This considerable number of schools is evidence of the global progression and institutional development of judo.

The pedagogical adaptation of judo to non-Japanese audiences was the major driver of this evolution. Judo masters such as Mikinosuke Kawaishi (1963), Gunji Koizumi (1960) and Geoff Gleeson (1967) developed alternative classifications that diverged from the original *Gokyo-no-waza* (five sets of techniques). Too rigid and inappropriate, the Kodokan programme was poorly adapted with Western technical and pedagogical expectations. By restructuring the teaching and learning of techniques, these systems fostered distinctive teaching methods that matched local educational contexts better. In this way, they promoted the development of judo, which established the emergence of national identities and distinct styles, reflecting their cultural values and institutional visions.

According to Petrov (2014), a national style is a know-how that reflects the nation's identity through a common practice, producing the same manner of combat. International events such as the Olympics and world championships still serve as a powerful context for countries to showcase their unique

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combat styles. These occasions allow them to affirm their cultural identity and heritage. Gaudin (2009) reported that national identity merges with combat identity. However, style in judo is not solely a population construct. Various factors form it, such as culture, geography, politics, weight, gender, and competition, as well as specific techniques, skills, aptitudes, weapons, equipment, positions, movements, tactics, strategies, physical attributes, and psychological profile (Hilpron & Rosselin, 2010; Martinkova & Parry, 2016; Burns et al., 2018). Hence, judo style is a cultural marker and a product of complex technical, physical, tactical and psychological determinants.

Mirallès (2007) describes style as the result of deliberate, patient development of unique skills that confer competitive advantage. It is a key aspect of professional identity. Actions, attitudes and stable behaviours are recognised easily. Fouquet (2019) further highlights that a judo champion's greatness manifests through a style that marks their distinctive signature uniquely on the tatami. Aitken (2010) argues that defining fighting styles in martial arts is a challenging task. For this reason; no clear consensus on the exact definition has emerged.

Recent changes to refereeing rules have altered competitive judo. Thus, the 2010 ban on leg grabs and any contact with the legs during standing techniques narrowed the technical repertoire significantly (International Judo Federation, 2010). Simultaneously, the IJF intensified penalties for defensive tactics and reinforced control over *kumi-kata*, further restricting competition conduct and forcing *judoka* to adapt. From a technical standpoint, *judoka* aligned their favoured throws with current rules (Ait Ali Yahia, 2021). Tactically, they reconfigured their contest approach to address new risks and opportunities (Ait Ali Yahia, 2023). Consequently, these rule changes have affected the training content of many judo schools. This development raises a pivotal research question: to what extent do refereeing regulations, technical preferences and tactical decisions shape the fighting style of contemporary judo?

Several authors have highlighted the impact of fighting style in various combat sports, including sambo (Kozin et al., 2022), wrestling (Tropin et al., 2021; Iermakov et al., 2015), kickboxing (Pityn et al., 2017; Prystupa et al., 2019), Brazilian jiu-jitsu (Kanthack et al., 2022; De Paula Lima et al., 2017), mixed martial arts (Chernozub et al., 2018; Ma, 2023), capoeira (Assunção, 2014), taekwondo (Hammami et al., 2021), ultimate full contact (Loio Pinto et al, 2020), and boxing (Dzhumakhonovich, 2020; Korobeynikov et al., 2015). In contrast, academic research of this nature in judo remains limited (Sikorski, 2005; Heinisch & Oswald, 2007). Competitive practice has diversified, giving rise to distinct styles that require detailed examination. The present study pursues four primary aims: 1. to clarify the concept of fighting style in judo; 2. to examine the influence of rule changes on combat attitudes; 3. to analyse the role of technical preferences in differentiating styles; and 4. to evaluate how tactical approaches, often shaped by regulatory constraints, affect the dynamics of combat.

METHODOLOGY

This study adopts a narrative review approach, aiming to offer a thoughtful and critical synthesis of existing knowledge rather than an exhaustive, systematic examination of the literature. Such an approach is especially well-suited to addressing the multifaceted and interconnected nature of the relationships between refereeing rules, technical preferences and tactical decisions in modern judo. By considering these elements within their broader historical and contextual settings, this review seeks to provide a nuanced understanding of the complex dynamics at play.

Sources and search strategy. We conducted comprehensive searches of leading academic databases, including PubMed, Scopus, Web of Science, SportDiscus, Cairn, Dialnet, and Google Scholar, to identify publications pertinent to this study. We employed a carefully selected combination of keywords in both English and French. The keywords encompassed a range of relevant concepts. These comprised combat sports, fighting style, refereeing rules, regulatory changes, judo, technical choices, tactical choices, and combat strategy. Keywords included *kumi-kata* (grip fighting), *tokui-waza* (preferred techniques), as well as *nage-waza* (throwing techniques), *tachi-waza* (standing techniques), *ne-waza* (groundwork), and *katame-waza* (grappling techniques). Our temporal scope spanned from 1948 to the present to capture the substantive regulatory reforms introduced by the IJF. To ensure a thorough and inclusive perspective, we incorporated not only peer-reviewed journal articles but also scholarly book chapters, doctoral dissertations, conference posters, press articles and conference proceedings. We conducted this bibliographic search between September 2023 and July 2025, without imposing any language restrictions.

Inclusion and exclusion criteria. Studies were included if they addressed one or more of the following dimensions: 1. the evolution of refereeing rules and their implications for performance; 2. technical repertoires and preferences in elite judo; and 3. tactical approaches to combat under regulatory constraints. Publications exclusively describing technical gestures without analytical interpretation, or studies focusing solely on other combat sports, were excluded unless they offered relevant comparative insights.

Data analysis. We critically reviewed selected sources and systematically extracted and organised their findings around three principal analytical dimensions: refereeing rules, technical preferences and tactical choices. We then performed a thematic synthesis to examine each dimension individually, along with their interrelations. We placed special emphasis on discerning both commonalities and differences across studies. Particular attention was paid to identifying convergences and divergences across studies, as well as contextual factors such as national judo schools or the period of rule implementation.

Scientific rigor. We undertook a narrative review that, while not exhaustive, clearly explains the search strategy and criteria used to maintain transparency. We recognise possible limitations, such as selection bias and the subjective nature of interpreting findings, common in this type of review. However, this approach provides a broad and thoughtful understanding of how refereeing rules, technical skills and tactical choices come together to shape the fighting styles seen in modern judo.

DISCUSSION

The concept of style in sports has been examined rigorously using various theoretical paradigms. This examination has provided a comprehensive, nuanced and multidimensional understanding of this complex concept. We categorize the existing perspectives into four primary domains: biomechanical, systemic and tactical, cognitive and psychological, socio-cultural and identity. From an energy perspective, Martin (1948) defines style as an economical method to enhance movement efficiency by balancing the involved forces while minimising effort and fatigue. This approach described the style as a fluid and economical execution of movement. In judo, this approach is particularly pertinent. Conserving energy during extended bouts is crucial for maintaining the technical efficiency needed to win.

Aitken (2010), selecting a systemic approach, defines style as a system or method applied to combat and its various situations, allowing the fighter to anticipate and react to different situations they encounter. For Chovaux (2005), the style represents the ideal application of tactical patterns, indicating tactical maturation among athletes, particularly during competitions in team sports. The style contributes to creating team identity through invariants and factors, such as the coach, the athlete's technical expertise and others. Only the perfect motor strategies during competitions can achieve this style. In judo, for example, the Russian and Japanese team styles reflect their respective technical and tactical choices, as well as their strategic responses to diverse combat scenarios.

Inzirillo and Bournois (2009) have examined the cognitive dimension of style. Tennis champions, for example, develop sport-specific intelligence that helps forge their distinctive style. Hard work, innate talent and self-confidence constitute the fundamental elements that shape their original style. Dzhumakhonovich (2020) noted that the typological characteristics of an individual's nervous system also play an essential role in building the individual's style, indicating that neurological traits shape motor preferences and decision-making tendencies in combat. Shohei Ono, the 2016 and 2021 Olympic champion, illustrates this approach. His style relies on extreme cognitive anticipation and precise tactical execution, in contrast to other fighters who rely more on reactivity and adaptability. Clot and Faïta (2000) argue that in industrial and organisational psychology, adopting a professional gesture is a personal process that, through accumulated experience, contributes to the development of a unique style.

Style can be associated with specific practices within a discipline, reflecting a cultural or community affiliation. Each wrestling style reveals a distinct cultural origin; the discipline's structural organisation adapts accordingly (Tanguy, 2014). Likewise, freestyle skiing and free riding practitioners have developed distinct stylistic identities through their values and behaviours, allowing them to stand out from traditional skiers (Vermeir & Reynier, 2007). There is a significant contrast between competitive international judo and *Kodokan* judo, in which combat styles may reflect cultural influences or affiliations with specific schools (French, South Korean, Brazilian, etc.). To succeed in high-level competition, a personal style remains a key factor. No-one can stand out, assert their identity and build a reputation as experts in their field without it (Mirallès, 2007). Fouquet (2019) states that an individual's manner of being or acting, often imbued with aesthetics, defines their style. In combat sports, elements such as the elegance of execution, the fluidity of sequences and the precision of movements that form this aesthetic contribute to the singularity of each athlete.

Factors influencing style formation

According to Mirallès (2007), style is a unique signature. Describing or imitating a specific style is a complex task. Petrov (1984) also characterises wrestling style as the personal expression of a combatant in competition. From a biomechanical perspective, various internal and external factors shape judo fighting style, including referee rules, competition structure, preferred competition pace, *kumi-kata* variations, types of throws employed (classic, innovative, chaotic), types of throwing technique (lever or couple), training methods, skill levels, and high-dynamical situations, and so on (Sacripanti, 2013a). Collectively, these variables shape the evolution of a style, highlighting the need for tailored training approaches to enhance performance and strategic execution in combat sports.

Various intrinsic and extrinsic factors contribute to the creation of a distinct style within combat sports through a complex process. Countries have developed distinct judo styles by adapting the sport to their cultural and morphological characteristics, while maintaining the principles of gestural execution (Brousse & Matsumoto, 1999). Petrov (2014) expands this concept by defining style as a complex system encompassing not only combat techniques and training methods but also philosophical, mystical, or shamanic elements. This perspective underscores the cultural and spiritual aspects often associated with martial arts practices.

Several important factors, including anthropometric, technical, tactical, physical, and psychological preparations, influence wrestling styles (Tropin et al., 2021). Petrov (1984) identified other factors, such as the consistency of technical-tactical indicators, which reflect their level of de-

velopment, preparation, traditions and social background. Levitsky et al. (2020) reported that the skill level and experience of a *judoka* generally influence their fighting style and control. Techniques and tactics become more varied and unpredictable as their mastery increases. Thus, elite competitors displayed highly adaptable styles, tailored to various fight scenarios.

In boxing, Dzhumakhonovich (2020) expands this framework by incorporating psychodynamic properties, morpho-functional characteristics, technical-tactical preparation profiles, specific training load planning modalities, and distinct psychophysiological responses generated by these loads. Kozin et al. (2022) argue that the physiological basis of style formation is genetic, formed by neurodynamic processes and psychophysiological capacities. Integrating these factors into training will help identify athletes' predispositions toward particular fighting styles.

Beyond physiological and technical factors, social and cultural elements are essential, including the influence of history, folk traditions and socio-psychological, moral and ethical norms in shaping wrestling styles (Petrov, 1984). Wrestling styles delineate distinct groups through their unique expressions, while also strengthening group identity (Petrov, 2014). National training systems, federations and historical legacies play a pivotal role in shaping the distinctive features of combat styles across countries. Additionally, Latyshev et al. (2014) propose an individualised training system for wrestlers that integrates two key subsystems: athlete management (covering competition rules and scientific knowledge) and coach management (including training, competition and activities outside these contexts).

The diversification of judo style is due to various institutional influences (federations, Olympic committees, national governing bodies), as well as weight categories, local practices, the increasing spectacle of competitions, media coverage, iconic athletes, and body tactics (Hilpron & Rosselin, 2010). From a developmental perspective, Blais and Trilles (2004) highlight motor learning and physical development as fundamental to *judoka* style. Competitive requirements and the evolution of the discipline also contribute to the formation of structured and sustainable styles (Iermakov et al., 2015).

The diversity of judo styles

Contrary to Reay's assertion that judo has a uniform style globally, it is essential to note that judo is diverse and varies significantly from region to region (Reay, 1985). Since its creation, *Kodokan* judo has given rise to several schools and styles. Japan itself provides a striking example. Each region has developed its unique characteristics that have influenced its success at the international level. Japanese officials have acknowledged this diversity by incorporating representatives from various universities on the national team staff. It is a way to highlight each style's contribution to the discipline's development (Hilpron & Rosselin, 2010). The soft cultural form of judo encourages these creations. It distinguishes between physical performance and meaning, and facilitates their adaptation to different levels. In contrast, a solid cultural form is difficult to change because of its close connection with value, meaning and physical practice (Appadurai, 1996).

There are several typologies used to classify different styles of judo. Based on predominant physical characteristics, the French Federation of Judo and Associated Disciplines (FFJDA) identified four principal *judoka* styles: strength, skill, speed and endurance (FFJDA, 1985). In contrast, Kozina et al. (2015) identified three primary fighting styles using a mathematical model. First, the powerful style emphasises strength and muscular endurance. Second, the fast style emphasises sustained speed and agility. Third, a variable style requires a high level of co-ordination. However, it remains unclear whether a fighter's physical fitness determines their fighting style or if their chosen style shapes their physical development (Franchini, 2014). Sikorski (2005) distinguishes four styles. French *judoka* have developed a tactical style, Russian *judoka* have developed a physical style and Georgian *judoka* have preferred the Sambo style, defined by atypical techniques and solid defence. Polish, German and Dutch *judoka* adopted a technical style. Heinisch and Oswald (2007) have highlighted two predominant styles at international competitions between 2000 and 2006, representing key regional approaches in judo: the technical Asian style (including Japan and South Korea) and the powerful Eastern European style (covering Russia and Georgia).

Based on an analysis of competitive depth and medal-winning potential, a summary statistical assessment of sporting achievements reveals a hierarchical structure among national judo teams. According to Dimitrova (2020), there are three principal groups. The first one consists of countries with consistently strong and homogeneous teams, including Japan, Russia, France, South Korea, Brazil, Azerbaijan, and Georgia, which maintain stable rankings across major championships. The second comprises nations such as Hungary, Poland, Great Britain, the Netherlands, Belgium, and Cuba, which typically depend on a smaller core of 3-4 key competitors to secure medals. A third consists of countries such as Finland, the USA, Italy, Spain, the DPRK, and Bulgaria, where standout individual athletes, rather than team depth, achieved the high rankings. Securing a medal at a world championships or Olympics requires a team to have at least 3-4 competitors with real medal-winning potential, owing to the intense level of competition. However, despite the notable achievements of the Islamic Republic of Iran, this author did not mention them among these countries. For instance, at world championships, Arash Miresmaeili won two gold and two bronze medals, Saeid Mollaei earned one gold and one bronze medal, while Mohammad Mohammadi achieved a bronze medal (Tehran Times, 2018).

Agility, dynamic movement and strategic use of combinations in both offensive and defensive situations are essential elements that characterise Asian *judoka*. On the other hand, this Asian judo style prioritises technical precision, adapta-

bility and aggressive but controlled engagement (Dimitrova, 2020). Some purists worried that the Japanese style was losing its unique identity due to competition from various other culturally influenced fighting styles. This diversity has led to mutual innovation among schools, with Japanese judo remaining intact, while Georgian and Mongolian styles have evolved to become more effective (Brousse, 2024).

The Influence of sambo and traditional wrestling

The development of judo as a sport has expanded the range of techniques used significantly. Athletes have begun to integrate techniques from sambo, Canarian, Breton, Turkish, Mongolian and Georgian wrestling. While these additions brought fresh energy and variety to competitive judo, they also sparked some debate. Traditionalists perceived these changes as straying from the core principles that define authentic judo, revealing a deeper tension between embracing innovation and respecting tradition in the sport (Brousse, 2003).

Sambo draws its foundations from judo and jiu-jitsu, as well as from the martial arts of the peoples of the former USSR, including Kurash from Uzbekistan, Chidaoban from Georgia, Gulesh from Azerbaijan, and certain traditions of Slavic and European wrestling (Sergeevich, 2022). Judo and sambo practitioners both wear a gi-style jacket and share similar scoring systems. Judo prioritises throws from a standing position, with strict prohibitions on leg grabs since 2010. *Judoka* achieved victories through throws, pins or submissions via chokes and arm locks. In contrast, sambo incorporates a broader range of grappling techniques, including leg locks and extensive leg grabs, influenced by Greco-Roman and freestyle wrestling, while banning chokes altogether. Sambo's unique feature is that the attacker must remain standing after a successful throw to achieve a total victory, unlike judo's ippon. Additionally, sambo is notable for not using pins to decide contests. As a hybrid combat sport, it blended elements from jacket wrestling and traditional wrestling (Manuatu, 2023).

Russian *judoka* have gradually integrated elements of sambo into their technical repertoire, since their first participation in the European championships, enriching their strategies and expanding their tactical options (Brett & Scott, 1998). This synthesis gave rise to a distinctive style, characterised not only by physical intensity but also by unorthodox techniques that diverge from traditional judo methodologies. Over time, Russian *judoka* cultivated a pragmatic conception of initiative, one deeply rooted in enduring local wrestling traditions and a commitment to tactical efficiency rather than abstract philosophical ideals (Sacripanti, 2010). These historical developments vividly demonstrate how Russian judo has been elaborated through a dynamic interplay of external influences and domestic traditions, culminating in a unique identity that continues to influence the sport's evolution on the global stage.

At the 1962 European Judo Championships, the Soviet team delivered an impressive performance, securing two gold medals, two silver and one bronze, which earned them a third-place finish in the team standings, collectively. This achievement reflected the emerging strength and competitive spirit of Soviet judo on the continental stage. Building on this momentum, the four Soviet *judoka* who competed at the 1964 Olympic Games each earned a bronze medal, underscoring their resilience and skill while marking an important milestone in the Soviet Union's growing prominence in the international judo community. These accomplishments not only highlight the dedication of the athletes but also the broader development of judo in the Soviet Union during this formative period (Gulyayeva, 2016).

From a tactical perspective, sambo shares similarities with judo and jujutsu but lacks the philosophical and pedagogical underpinnings that characterise Kano's method, functioning instead as a purely practical combat sport (Sato, 2013; Cynarski, 2025). This orientation reshaped the nature of judo competition, shifting it from a middle-distance grappling discipline toward a close-combat style that emphasised leg grabs and powerful lifting techniques, such as *kata-uchi-ashi-dori*, *kata-sode-ashi-tsurikomi-goshi*, and *kata-hiza-te-o-uchi-gake-ashi-dori* (Inman, 2005). Consequently, *judoka* often adopted stances closer to those of wrestlers, frequently reducing reliance on the traditional judogi grip during throw execution.

The success of Soviet *judoka* in the 1970s marked a critical shift, fully integrating traditional wrestling styles into the development of international judo. Figures such as Shota Chochishvili, Vladimir Nevzorov, Valeri Dvoinikov, Shota Khabareli and Nikolay Solodukhin achieved success at major competitions, including world championships, Olympic Games and the European championships, demonstrating the competitive value of sambo-inspired techniques (Quidet, 1983; Adams, 1993; Pickering, 2019). Their achievements revealed the power of a dynamic and physically intensive style deeply rooted in regional wrestling traditions. Shota Khabareli, an Olympic champion in 1980 in Moscow, further exemplified this synthesis with his celebrated *obi-tori-gaeshi*, also known as *yagura-nage* in sumo, adapted from Georgia's chidaoba wrestling. Aggressive grappling, precise stance control and explosive execution are key elements defining this technique (Pickering, 2019; Scott, 2012). This hybrid approach carried into the 21st century through athletes such as Igor Makarau, the 2004 Olympic champion in the -100 kg category, whose frontal lifting techniques and emphasis on physical power highlighted the continuing influence of sambo in elite judo (Bury et al., 2004). That same year, the victories of Ilias Iliadis (-81 kg) and Zurab Zviadauri (-90 kg) reinforced the strength of *judoka* from former Soviet republics, who combined judo fundamentals with the intensity and tactical depth of regional wrestling traditions successfully (Chesterman, 2004; Sato, 2004). The Soviet judo school continues to shape the development of sport worldwide due to its enduring technical legacy.

The influence of sambo on judo has provoked a range of reactions from both traditionalists and innovative practitioners. Several critics, including distinguished *judoka* such as Adams (1993) and Alexandre (2006), argue that this progression risks undermining the foundational principles established by Jigoro Kano. This contention reflects ongoing debates about preserving judo's core values despite evolving practice. These esteemed champions have observed a discernible trend in which judo is progressively aligning more closely with wrestling, consequently diverging from its foundational ethos and original philosophical underpinnings. Conversely, proponents of this hybridisation view it as a significant technical and strategic advancement, particularly for European judo. At the London Olympics, the Japanese *judoka* had their historically worst performance, in terms of gold medals, whereas Russian *judoka* achieved outstanding results, winning three gold medals, two silver and one bronze (Ait Ali Yahia, 2015). These achievements strengthen their reputation as formidable competitors. Their extensive experience in sambo contributed to their success, according to Yasuhiro Yamashita, an Olympic and world champion who praised their performance (Sovetova, 2015).

The refereeing dimension of judo style

The concept of style in judo is inherently dynamic and continuously evolving, shaped by competition demands and refereeing decisions rather than being fixed in an immutable form (Sacripanti, 1987). Supporting this view, Tanguy (2014) emphasises that fighting styles, from both scientific and training perspectives, are essential to combat systems, even in their most subtle and nuanced expressions. Although these styles are important, they remain inherently transient, continually determined by evolving rules and refereeing interpretations. Consequently, judo styles should be viewed not as fixed entities but as dynamic and adaptable, mirroring the ongoing sport's progression.

Judo regulations have undergone three main periods marked by significant shifts. The first, from 1882 to 1964, was centred on a shared Japanese cultural model dominated by the Kodokan. The second period, from the 1960s to the early 2000s, saw Western influence promoting rationality and independence, particularly from Europe, which led to both adaptation and conflict. The third period began in 2009 with the IJF World Tour, which emphasised media professionalism and sought to align judo with major professional sports, leading to a significant cultural transformation and revised roles for sport and refereeing (Brousse, 2024).

The frequent and significant changes to judo rules, orchestrated between 2010 and 2020, have influenced the fighting styles of high-level *judoka* profoundly, primarily aiming to promote the IJF's positive judo initiative, focused on attack and the maximum score (*ippon*) (Calmet et al., 2017; Adam et al., 2018; Barreto et al., 2022; Kajmovic et al., 2022). Additionally, recent judo rule changes (2017-2018) have reduced penalties and increased scoring decisions, improving spectator appeal (Doppelhammer & Stoeckl, 2020).

Refereeing occupies a pivotal position in the management of judo contests. It influences strategic approaches and technical choices significantly. Acting as a regulatory body, it is responsible for enforcing rules, evaluating competitors' actions, and adjudicating contest outcomes. Moreover, the interpretation of rules and refereeing decisions profoundly affects the flow and dynamics of contests, encouraging *judoka* to accommodate their styles to improve performance. Sato (2013) argues that such rule modifications have impacted both the style and underlying philosophy of judo significantly, leading to a shift in how the sport is perceived even within its country of origin, Japan.

One of the most radical and influential rule changes in judo was the prohibition of direct grabbing and attacking below the belt, introduced in 2010, clarified in 2013, and later softened, in 2017/2018 (Barreto et al., 2022; Boguszewski, 2011). Largely, athletes and coaches considered this rule very impactful, as it sought to align modern judo more closely with the traditional Japanese style by promoting a more vertical posture. The change resulted in the near-total abandonment of several techniques, including *morote-gari*, *kata-guruma*, *kuchiki-taoshi*, *kibisu-gaeshi*, and *sukui-nage* (Barreto et al., 2022; Boguszewski, 2011; Gardasevic & Stankovic, 2020). Ultimately, this prohibition transformed judo competition significantly by reshaping the technical repertoire and emphasising upright fighting tactics.

Rules governing *kumi-kata* have developed judo fighting styles significantly too. Specifically, unconventional grips such as crossed, single-sided and belt grips were required to be followed by an immediate attack or the athlete would risk receiving a *shido* penalty (Barreto et al., 2022). As a result, the time spent in the gripping phase decreased notably (Barreto et al., 2021). Overall, these rule changes prompted competitors to adopt a more strategic and careful approach to gripping. *Kumi-kata*'s rule changes have forced *judoka* to adapt their style and techniques, particularly in duration, breaking holds and one-handed gripping (Samuel et al., 2019).

The IJF continuously updates its regulations to guarantee fairness and safety within the sport. These modifications, however, influence combat dynamics considerably. For instance, adjustments to rules concerning passivity and scoring criteria have prompted shifts toward either more aggressive or more defensive competitive styles, thereby altering the pace and tone of contests. The introduction of rules that encourage offensive initiatives has fostered a more dynamic judo, in which *judoka* pursue proactive attacks strategically while reducing the risk of penalties. The banning of specific techniques (IJF, 2010, 2013, 2022) has led coaches and athletes to revise technical and tactical training styles to comply with the new regulations (Katicips et al., 2018; Lampe et al., 2022; Ait Ali Yahia, 2021). Changes in judo rules should include tactical training for coaches and athletes of all ages and genders to reduce penalties and enhance contest engagement for spectators (Kajmovic et al., 2022). Thus, ongoing rule changes continue to shape not only the conduct of contest but also the preparation and style of judo practitioners worldwide.

Critics have expressed concerns about a perceived lack of spectacle in competitions, challenging several recent rule modifications and refereeing practices. In their study of the impact of refereeing on performance at the Tokyo 2020 Olympic Games, Rudenko et al. (2023) criticised the ban on below-the-belt techniques, arguing that this restriction has limited the diversity of *judoka* competitive arsenals. In contrast, Miyake et al. (2016) found that IJF rules influenced contest outcomes at the All-Japan championships by increasing the points scored, making the tournaments more exciting for spectators. Although well-intentioned, fighters and spectators perceived refereeing decisions as inconsistent or biased. Cultural and individual differences have influenced their judgment. Accordingly, the effect of rule modifications on audience perception is inherently complex and multifactorial, although the deliberate intent is to augment both the excitement and equity of the sport.

Beyond technical considerations, several authors have expressed concerns regarding the procedural dimensions of rule-making. Samuel et al. (2019) blame the IJF for failing to adequately incorporate the perspectives and needs of athletes and coaches in the development and implementation of rule changes. Consequently, many athletes have had to adjust their technical repertoire, tactical strategies and fighting styles to refereeing expectations. For the same reason, they often focused on spectacular techniques to impress judges and earn points (Franchini et al., 2011). Yet, aligning with these expectations presents significant challenges. Lincoln (2015) emphasises that acquiring proficiency in a new competitive technique generally requires two to four years of rigorous training, rendering such adaptations both time-consuming and psychologically demanding. Thus, procedural inadequacies in rule formulation have imposed complex and severe adjustments on athletes seeking to maintain competitiveness amid shifting evolved regulations.

The technical dimension of judo style

A judo attack system is based on preferred throws combined with specific *kumi-kata*, forming a structured approach that improves with practice (Calmet & Pierantozzi, 2019). Thus, *kumi-kata*, as a crucial element of this system, contributes to the structuring of the styles of the major schools (Inman, 2010). To throw their opponents, each *judoka* develops their own gripping technique. As a result, numerous judo schools have developed a variety of gripping techniques through participation in major competitions. Kashiwagura et al. (2023) identified 25 distinct gripping configurations employed internationally, underscoring this variety. Sacripanti (2010) conducted a study comparing the leading approaches to *kumi-kata* used by Russian and Japanese judo schools. Thus, the Russian *kumi-kata* method aims to achieve a dominant position by forcing the opponent to lean forward, thereby increasing their instability and reducing their ability to move quickly. Conversely, adopting a standard *kumi-kata* (sleeve and lapel), the Japanese style achieves a similar effect by skillfully applying their body weight through classical grips, which slows the opponent's speed. By controlling and managing spatial positioning, Russian *judoka* gain advantages in executing throws effectively. Both traditional and contemporary Japanese *judoka* typically fight with standard *migi* (right) or *hidari* (left) grips, occasionally incorporating sleeve or high-collar grips, while maintaining a moderate distance from their opponents.

Gripping the collar and sleeve is the traditional and standard technique of *kumite* in Japan; it is considered the most effective method. This approach remains prevalent in international level competitions today, with competitors likely to choose these grip points based on this longstanding tradition. They then execute techniques without hesitation, adhering to the traditional *kumite* style (Ito et al. 2019). In contrast, several countries, including Georgia, Kazakhstan, Azerbaijan, Mongolia and other Eastern nations, have viewed the Russian style as cultural heritage (Sacripanti, 2013b). Adams (1993) highlighted the differences between the two outstanding champions, Yamashita and Khabareli, by examining their contrasting guard styles. Despite their markedly different *kumi-kata* approaches, ranging from the most traditional to the most unconventional, both dominated Olympic competition effectively. The style of *kumi-kata* represents a fundamental factor of the attack system, serving to differentiate judo schools through their distinctive strategic approaches.

The choice of *tokui-waza* is a defining feature of the *judoka* style. Ait Ali Yahia (2015) defined a favourite throw as a judo technique used often, with efficiency and stability. As a unique signature on the tatami, this favourite throw reflects a *judoka*'s offensive system. Distinct national schools of judo reflect not only specific technical preferences but also underlying combat philosophies. The existing literature consistently emphasises the pivotal importance of *nage-waza* in achieving the highest scores in judo competition. However, their effectiveness is contingent upon a complex interplay of dynamic factors, including the regulatory framework, the competitive round, gender, weight category, the athlete's level of experience, grip strategies, and the temporal sequencing of actions in combat (Moronta et al., 2025). For instance, the French tradition has long prioritised *ashi-waza* as its defining technical characteristic, whereas Japanese and Soviet *judoka* have historically emphasised a more balanced approach, integrating both *ashi-waza* and *te-waza* (Calmet, 2010). This distinction delineates two contrasting tactical approaches in sport science. One emphasies precision and control through footwork and the other focuses on combining dynamic mobility with upper-body strength and dominance. These differences exemplify the diverse technical hierarchies that underpin each national judo system, illustrating how cultural and strategic factors shape the prioritisation of techniques.

The Asian school of judo, prominently represented by Japanese and South Korean *judoka*, is distinguished by its exceptional technical mastery in both *tachi-waza* and *ne-waza* techniques (Dimitrova, 2020). Sertić et al. (2010) characterised Japanese judo in two distinct technical groups:

the highly effective *ashi-waza* (leg techniques) and *te-waza* (hand techniques), and the moderately effective *koshi-waza* (hip techniques) and *sutemi-waza* (sacrifice techniques). Brazilian and European competitors tend to merge *ashi-waza* and *te-waza* into a single functional category, reflecting a more pragmatic and competition-driven approach to grouping techniques. Effectively, Japan's judo tradition is illustrated by a consistent emphasis on *ashi-waza* techniques, including *uchi-mata*, *o-uchi-gari*, *ko-uchi-gari*, *o-soto-gari*, and *de-ashi-harai*, alongside *te-waza* techniques such as *seoi-nage* and *tai-otoshi* at world championships (Adam et al., 2011; Adam & Sterkowicz-Przybycień, 2018) and the All Japan Championships (Adam et al., 2013c, 2015), where these techniques have shown high efficiency. However, at the 2012 London Olympics, the Russian team, representing Eastern judo schools, demonstrated a strong proficiency in *ashi-waza* techniques, including *ko-uchi-gari*, *de-ashi-harai*, *ko-soto-gari*, *o-uchi-gari*, and *uchi-mata*. They also excelled in *te-waza* techniques, including *tai-otoshi* and *seoi-nage* (Adam et al., 2013a). The primary weakness of the German *judoka* at these Olympics was their lack of effectiveness in *nage-waza* (Heinisch et al., 2013). Similarly, Ahmedov et al. (2024a) identified *ashi-waza* as the dominant technical group, encompassing *uchi-mata, ko-soto-gari, ko-uchi-gari*, and *o-soto-gari*, followed by *sutemi-waza* such as *tomoe-nage, ura-nage*, and *tani-otoshi*, as well as *te-waza*, including *uchi-mata-sukashi*, performed by Uzbek *judoka* at three national events between 2021 and 2022. While some techniques are broadly acknowledged, how they are adapted and integrated demonstrates pronounced differences in national technical repertoires and tactical methodologies. This comparative analysis highlights the distinctive implementation of judo techniques across diverse cultural and competitive environments, thereby contributing to the strategic plurality of international judo.

In a study of 28 major international competitions, including the 2017 and 2018 World Championships, Szczepanik et al. (2023) identified three unique profiles: Japanese *judoka*, notable for their relentless offensive activity; Georgian *judoka*, recognised for their efficiency and focus on *koshi-waza*; and French *judoka*, who excel in imposing penalties on their opponents, often leveraging *sutemi-waza*. Even the direction of attack shows divergence: the Japanese prefer attacking from the right, whereas Georgians and the French typically favour the left. In contrast, Sertić et al. (2016) corroborated that Croatian *judoka* predominantly throw their opponents while moving forward to the right and left. Beyond these dominant schools, other national programmes, such as British, Taiwanese, Uzbek, Bosnian, Croatian and European, show a predominance of *ashi-waza* and *te-waza* (Miller et al., 2015; Ko et al., 2022; Ahmedov, 2020; Kajmovic & Huremovic, 2019; Sertić et al., 2016; Silva Batista et al., 2024), suggesting that these techniques form a global technical core, even if expressed differently across countries. This analysis demonstrates that although throws like *uchi-mata* and *seoi-nage* are skilled across different countries, their usage, prevalence and strategic application vary according to distinct cultural and institutional contexts. National judo traditions, therefore, represent more than just collections of techniques. They focus on combat philosophies elaborated by historical developments, teaching methods and competitive systems.

Although the majority of *judoka* prefer standing combat to execute throws and avoid ground fighting, a notable minority adopts strategies focused primarily on *ne-waza*. These *judoka* seek to dominate ground situations through immobilisations, strangles or joint locks, reflecting a strategic variation that contributes to the stylistic diversity present at high levels of judo competition (Witkowski et al., 2012; Akhmedov, 2020). Adolf et al. (2018) identified the fight control styles during *ne-waza* as predominantly passive and largely ineffective. Many Russian *judoka* appeared to stall for time strategically, maintaining an early advantage rather than pursuing dominant positions or submission opportunities actively. As a result, this aspect of competitive performance was deemed unsatisfactory, indicating a need for improved technical and tactical proficiency in *ne-waza* to enhance overall effectiveness in groundwork scenarios in high-level competition settings. Consequently, *ne-waza* continues to serve as a fundamental and strategically essential element of judo, effectively complementing the more famous throwing techniques.

Historical data shows how different national styles have evolved. Between 1982 and 1988, Japanese *judoka* demonstrated a significant improvement in their usage of *ne-waza* techniques, skillfully exploiting opportunities to transition into groundwork. However, this orientation towards *ne-waza* did not give them a clear technical advantage over French opponents (Roux, 1990). The Japanese strategic shift towards enhanced proficiency in *ne-waza* illustrates a change in their practice, but it does not guarantee superiority. Kosei Inoue, the Japanese head coach, notes that Intensive and repetitive training in *ashi-waza* and *ne-waza* is vital for skill development. Developing the ability to succeed on the ground is, therefore, highly beneficial. Many young practitioners today lack the necessary responses for various ground situations. Additionally, strangulation techniques will become increasingly valuable under the new *judogi* control system (Ogawa, 2011).

The limited mobility characteristic of the heavyweight division is the primary reason for its greater emphasis on *ne-waza* techniques compared to other weight categories. Several studies have highlighted that fighters in this category rely more heavily on grappling and submission strategies. Their limited ability to move quickly and attack with agility results from physical constraints (Stankovic et al, 2015; Ahmedov, 2020; Akhmedov et al., 2020; Osipov et al., 2023). This strategic reliance on *ne-waza* enables heavyweight competitors to exert effective control over opponents by exploiting force advantage rather than speed. Consequently, the unique physical constraints of the heavyweight division shape a distinct tactical approach that values groundwork proficiencies. Also, Davlat Bobonov, the Uzbek *judoka* and bronze medallist at the 2021 Tokyo Olympics, predominantly performed in *ne-waza* during this competition, with a frequency exceeding *nage-waza* techniques 3:1. In terms of technical efficiency, his *osae-komi-waza* demonstrated

the highest effectiveness, followed by *kansetsu-waza* and then *shime-waza*. This distribution underscores Bobonov's strategic reliance on ground control and pinning techniques, reflecting a specialised tactical profile that contributed significantly to his competitive success (Ahmedov et al., 2024b).

At the international level, the Russian and Japanese judo teams have displayed distinct technical preferences in groundwork during major international competitions. At the 2012 London Olympic Games, Russian *judoka* prominently employed *kuzure-kesa-gatame* and *ude-hishi-gi-juji-gatame*, highlighting their tactical emphasis on these techniques as part of their combat strategy (Adam et al., 2013a). From a technical groups standpoint, Japanese athletes demonstrated higher proficiency in *osae-komi-waza* (pinning techniques) than their opponents at the 2010 and 2013-2015 world championships (Adam et al., 2011; Adam & Sterkowicz-Przybycień, 2018). In contrast, Russian competitors showed greater effectiveness in applying *kansetsu-waza* (joint locks) and *shime-waza* (choke techniques) during the 2013-2015 world championships (Adam & Sterkowicz-Przybycień, 2018). The German male *judoka*, particularly the three medallists, demonstrated a marked superiority in *ne-waza*, which constituted their primary strength at the 2012 London Olympics. They dominated transitions from standing to ground combat. They excelled in ground fighting, significantly above the average of international medallists. Specifically, *osae-komi-waza* and *ude-kansetsu-waza* contributed to this success. Defensively, the German *judoka* conceded only a single point on the ground, reflecting their strong defensive capabilities in *ne-waza* (Heinisch et al, 2013). Recently, Uzbek *judoka* have performed *kami-shiho-gatame*, *yoko-shiho-gatame* and *kuzure-gatame* readily during their national competitions (Ahmedov et al., 2024a). These techniques, centreed on ground control and immobilisation, highlight their strong emphasis on *ne-waza*. Their effective use not only secures dominant positions but also plays an essential role in their competitive success. All these observations underline the unique groundwork techniques that define each country's strategy in top-level judo competitions.

The technical repertoire serves as a crucial indicator of overall competence. Elite athletes must possess a range of techniques in their competitive arsenal to overcome increasingly sophisticated defences. This repertoire diversity, produced through a combination of structured instruction and individual innovation, illustrates the *judoka*'s progressive development over time. Achieving technical excellence in judo requires a continually expanding repertoire of techniques because of ongoing exploration and adaptation (Ait Ali Yahia, 2021). Adam et al. (2012) observed that at the 2010-2011 world championships, double world champion Rishod Sobirov (UZB) exhibited the broadest technical diversity. In contrast, fellow champions Jae Bum Kim (KOR) and Ilias Iliadis (GRE) displayed a more limited repertoire of techniques, reflecting a narrower tactical approach. This distinction highlights varying strategic preferences among elite *judoka* during this period.

A *judoka*'s technical profile is often constructed by their school of origin or stylistic lineage, reflecting the foundational principles and training methodologies of that tradition (Hilpron & Rosselin, 2010). However, at the elite level of international competition, the primary determinant of success extends beyond mere affiliation with a specific school; it depends on a *judoka*'s capacity to adapt fluidly to dynamic, evolving contest circumstances (Calmet, 2010). Adaptability is fundamental in judo, a discipline that evolves dynamically rather than remaining static. The accumulation of experience, the incorporation of new techniques and the deepening of strategic understanding drive this progression. As a result, each *judoka* develops a distinct style, uniquely influenced by their individual personality, physical characteristics and the course of their personal and athletic development. Therefore, the *judoka*'s individual combat style arises as a synthesis of tradition, adaptability and ongoing personal evolution within the sport.

The tactical dimension of judo style

Petrov (1984) delineates wrestling tactics into four principal styles: offensive, defensive, counter-offensive, and a combined approach, reflecting the diverse strategic frameworks employed within the discipline. The offensive style involves continuous or intermittent attacks, while the defensive style focuses on countering opponents primarily by maintaining distance, using blocking kumi-kata. The counter-offensive style focuses on allowing the opponent to initiate action, thereby creating opportunities to identify weaknesses and execute effective counter-attacks. The combined style demonstrates tactical adaptability by switching with fluidity and intelligence between styles based on the fight's circumstances. These tactical categories apply to judo, where tactics similarly influence performance. Korobeynikov et al. (2015) identified a significant association between the offensive style and elevated work capacity, reduced fatigue and anxiety levels, as well as enhanced psychological comfort. In contrast, better speed and more efficient information processing characterised the defensive combat style. Thus, understanding and applying these tactical styles is essential for optimising athletic performance in combat sports.

Historical analyses of elite competitions reveal a tendency towards defensive styles among the top *judoka*. For instance, male athletes competing in the finals of the 2005 European Championships exhibited a notably precise defensive approach (Boguszewski & Boguszewska, 2006). Similarly, the 2012 London Olympic champions were noted not for their aggressive tactics but for their highly effective defensive strategies. Although they executed relatively few successful attacks, their defensive capabilities were incredibly efficient, underscoring the strategic importance of a resilient defensive style at the highest levels of competition (Adam et al., 2013b). Supporting this, Ait Ali Yahia (2021) confirmed that the London medallists exhibited greater defensive effectiveness compared to those in the 2004 Athens, 2008 Beijing and 2016 Rio de Janeiro Olympics. They also demonstrated

comparatively low assertiveness in offensive tactics. These findings highlight the critical role that defensive proficiency plays in assuring success.

In the 2010 Japan Championship, Japanese *judoka* concentrated on direct attacks primarily, followed by counter-attacks and combination attacks (Abdel-Raouf & Abdelhalem, 2011). Likewise, at the 2012 London Olympics, German male *judoka* embraced a different strategy, underlining direct offensive attacks slightly above the average. Their counter-attacks played a secondary role (Heinisch et al., 2013). However, Heinisch et al. (2017), analysing the subsequent Olympic cycle, attributed the complete failure of the German *judoka* at the 2016 Olympic Games to a pervasive deficiency in both technical and tactical effectiveness. From a tactical perspective, they outlined some deficiencies, including difficulties in establishing and maintaining grip control. The team demonstrated limited risk-taking and aggression in their attacks, often failing to exploit technical advantages. Moreover, their approach to initiating combat was occasionally overly cautious. Croatian *judoka* demonstrated yet another distinctive pattern, with a notably high frequency of direct attacks from a standing position, surpassing combination attacks by a ratio of 19:1 (Sertić et al., 2016). Beyond individual styles, national judo approaches become evident through performance trends seen across various competitions. At the 2010 World Championships, Japanese *judoka* cancelled most opponents' attacks successfully through excellent defence and counter-attacks, contributing to their success significantly (Adam et al., 2011). Further analysis between 2013 and 2015 demonstrated that both Japanese and Russian *judoka* maintained high defensive efficiency against *nage-waza* techniques, while revealing relative weaknesses in defending against katame-waza (Adam & Sterkowicz-Przybycień, 2018).

The outstanding achievements of legendary judo champions are undoubtedly attributed to the unique characteristics of their individual styles, which have played a decisive role in shaping their extraordinary performances. For instance, Tadahiro Nomura, who won three Olympic gold medals, had a distinctive explosive style, illustrated by dynamic combat techniques and exceptional tactical mastery, enabling him to adapt quickly and effectively to varying situations (Ait Ali Yahia, 2023). Besides, Waldemar Legien, the first Olympic champion in two different weight categories, was distinguished by remarkable adaptability, allowing his success at the 1988 and 1992 Olympics (Boguszewski, 2006; Adam et al., 2014). In the same vein, Teddy Riner combined offensive efficiency with strong defensive control, contributing significantly to his gold medal successes at the 2012 and 2016 Olympics as well as the 2010 and 2011 World Championships (Adam & Volska, 2016; Adam et al., 2012). Shohei Ono is widely considered the best *judoka* of his generation. The 2016 and 2021 Olympic champion is renowned for his highly dynamic and explosive judo style. He executes his techniques, especially *o-soto-gari* and *uchi-mata*, with impeccable timing and exceptional gripping, giving him superior control over his opponents. Ono's mastery in combining techniques seamlessly allows him to dominate the tatami with fluidity and precision (Ono, 2025). His commitment to achieving the perfect ippon, the ultimate demonstration of technical proficiency, makes him a formidable and respected adversary on the mat, embodying both the art and spirit of traditional Japanese judo. These case studies exemplify how individual stylistic qualities underpin sustained competitive excellence.

Nishioka (2010), as cited by Kajmovic et al. (2022), considered penalties in judo a critical tactical element, representing one of the key skills and strategies that a *judoka* can use effectively. By skillfully imposing penalties on their opponent and accumulating them, a *judoka* can use this advantage to win a contest. Understanding refereeing as a strategic component within judo underscores the critical importance of competition rules and boundaries for both athletes and coaches. Athletes and coaches can refine their techniques and tactical approaches to secure a competitive advantage by analysing the referee's decision-making patterns, interpretative tendencies and historical officiating trends. Adolf et al. (2018) highlighted the prevalence of passive fighting styles of Russian *judoka*, with an average of 2.7 *shido* penalties per contest. In light of the ongoing evolution of judo regulations that increasingly emphasise an active and aggressive style, it is hardly surprising that competitors commonly incur at least one shido during their bouts. Rudenko et al. (2023) highlight that some coaches train *judoka* strategically to capitalise on opponents' weaknesses by inducing fouls, thus turning rule enforcement into a tactical advantage. At the 2010-2011 World Championships, Jae Bum Kim's opponents incurred penalties due to his high attack frequency, whereas Ilias Iliadis' opponents received penalties because of his tactical mastery rather than the frequency of his attacks (Adam et al., 2012). The physical dominance and strategic intelligence of Teddy Riner have not only secured his success but also revealed a troubling reliance on exploiting refereeing tactics. At the 2012 London Olympic Games, three of his five victories came from opponents accruing *keikoku* penalties (warnings), with his adversaries collectively receiving twelve penalties while he was penalised only once (Adam et al., 2013b; Ait Ali Yahia, 2015). This disproportionate distribution of penalties raises critical questions about the fairness and consistency of refereeing in high-level judo. Riner's masterful manipulation of contest tempo to draw penalties underscores how understanding and exploiting refereeing dynamics can overshadow pure athletic skill, suggesting a need for ongoing scrutiny of officiating standards to preserve the integrity of competition.

The Russian 2016 Olympic gold medallist Khalmurzaev frequently employs *ashi-waza* techniques against right-handed opponents, with a particular emphasis on *sasae-tsuri-komi-ashi* on the right side and *o-soto-gari* on the left. Defensively, he counters his opponents' attacks with *ippon-seoi-nage*. Moreover, his offensive sequences encompass both forward and backward movements executed from either side (Soriano et al., 2024). Effectively, Khalmurzaev exploits the pace and distance of his contests by combining offence and defence actions. He targets right-handed opponents with specific leg techniques, while counter-attacking with a hand

technique. His ability to move both forward and backward with ease allows him to adapt quickly to whatever his opponent throws at him. This flexibility keeps his opponents guessing and lets him take charge of the contest; it is an immense advantage at the highest level of judo. Understanding these tactical moves gives us a clearer picture of how top *judoka* prepare and adjust their strategies to perform at their best under different contest situations.

The development of an individual fighting style in judo depends on several strategic variables, including the attack zone, combination techniques, attack direction and the *judoka*'s strengths and weaknesses in *nage-waza* and *katame-waza* (Takahashi et al., 2005). Between 1983 and 1986, Japanese, Soviet and French *judoka* demonstrated a marked preference for direct attacks in terms of attack direction. Notably, only Japanese athletes attacked forward and backward with equal frequency, whereas French and Soviet *judoka* preferred forward attacks (Calmet, 2010). More recent research by Szczepanik et al. (2023) corroborates these tendencies, highlighting that Japanese *judoka* maintain their dominance through direct attacks, Georgian *judoka* excel in counter-attacking techniques and French *judoka* exhibit substantial proficiency in technical combinations. These findings illustrate how strategic preferences in attack direction and technique contribute to the distinctive fighting styles observed among different nationalities.

Strategic and tactical elements are fundamental for understanding the diverse approaches in judo and their impact on athletes' competitive performance. These stylistic approaches are not static; they continuously evolve and adapt in response to combat context, opponents' techniques and *judoka*'s emotional and physical state (Santos et al., 2015). Therefore, successful judo practitioners must exhibit both adaptability and technical mastery by adjusting their style consistently throughout the contest progression. This ability to accommodate effectively under varying conditions is essential for achieving competitive success.

CONCLUSION

This narrative review explored the essential role that combat style has in judo and its significant influence on athletic performance. The rich diversity of fighting styles arises from the dynamic interplay between cultural tradition, individual traits and the shifting landscape of competitive environments. Since its origins in Japan, judo has evolved into a global sport, cultivating a diverse tapestry of styles and techniques. The emergence of national and individual styles reflects a complex interplay among physical, technical, tactical and socio-cultural factors, all of which are deeply affected by historical backgrounds, institutional frameworks and philosophical beliefs. Both personal growth and wider systemic factors shape the development of a unique style, emphasising the need for training approaches that encompass physiological, cognitive and cultural aspects.

The evolution of rules and their interpretations has profoundly impacted how refereeing influences athletes' strategies, techniques and overall judo styles. Amendments to the IJF regulations have prompted significant adjustments in training methodologies, reflecting the shifting competitive landscape. In the context of competition, refereeing serves not merely as a regulatory mechanism but also as a strategic factor that athletes and coaches must consider, thereby shaping the tactical approach and development of judo.

Judo style reflects national tendencies alongside individual adaptations from a technical perspective. Key indicators of stylistic differentiation include *kumi-kata*, *tokui-waza* and preferred attack directions. However, the technical repertoire is perpetually evolving. A combination of formal instruction, personal innovation and adaptations to changing tactical demands drives this evolution. Consequently, the technical repertoire embodies a dynamic, individualised progression of style.

Tactical behaviur in judo is intrinsically situational and fluid. The *judoka*'s style is formed constantly by dynamic factors, such as opponent strategies, combat progression and internal psychological states. It proves the high adaptability and strategic awareness of elite competitors. By comprehensively understanding the factors that influence style and tailoring training accordingly, athletes can enhance their performance and succeed in this demanding sport.

REFERENCES

Abdel-Raouf, Y., & Abdelhalem, A. (2011). Skillful and tactical analysis of the World Judo Senior Championship Japan 2010 according to the new amendments of the regulations. *World Journal of Sport Sciences, 5*(3), 188-190.

Adam, M., & Sterkowicz-Przybycień, K. (2018). The efficiency of tactical and technical actions of the national teams of Japan and Russia at the World Championships in Judo (2013, 2014 and 2015). *Biomedical Human Kinetics, 10*(1), 45-52. https://doi.org/10.1515/bhk-2018-0008

Adam, M., Laskowski, R., Kownacki, S., Abele, A., & Smaruj, M. (2018). Seven infringements most frequently committed by competitors during a judo fight. Ido Movment for Culture. *Journal of Martial Arts Anthropology, 18*(4), 39-45. https://doi.org/10.14589/ido.18.4.5

Adam, M., & Wolska, B. (2016). The general individual technical-tactical profile of the multi-medallist judo athlete Teddy Riner's. *Archives of Budo Science of Martial Arts and Extreme Sports, vol.12*, 37-44.

Adam, M., Tomita, H., Szymański, M., Klimowicz, P., Tyszkowski, S., & Wolska, B. (2015). Ways of performing judo throws, and their efficiency, assessed in the open weight category in All-Japan Judo Championships. Ido Movement for Culture. *Journal of Martial Arts Anthropology, 15*(1), 39-45. https://doi.org/10.14589/ido.15.1.6

Adam, M., Smaruj, M., & Laskowski, R. (2014). A technical and tactical profile of the double Olympic judo champion: A case study. *International Journal of Sports Science & Coaching, 9*(1), 123-138.

Adam, M., Wolska, B., Klimowicz, P., & Smaruj, M. (2013a). Characteristics of technical-tactical preparation of Russian men's judo representation during the Olympic Games in London in 2012. *Baltic Journal of Health and Physical Activity, 5*(4), 249-260. https://doi.org/10.2478/bjha-2013-0023

Adam, M., Tabakov, S., Blach, L., & Smaruj, M. (2013b). Characteristics of the technical-tactical preparation of male and female judo competitors participating in the Olympic Games - London 2012. Ido Movement for Culture. *Journal of Martial Arts Anthropology, 13*(2), 75-88. https://doi.org/10.14589/ido.13.2.6

Adam, M., Laskowski, R., Tabakov, S., & Smaruj, M. (2013c). Tactical- technical preparation of judo athletes participating in Japan championships. *Journal of Combat Sports and Martial Arts, 4*(1), 61-65. https://doi.org/10.5604/20815735.1073628

Adam, M., Smaruj, M., & Pujszo, R. (2012). The individual profile of the technical-tactical preparation of the World Judo Championships in 2010-2011. *Ido Movment for Culture. Journal of Martial Arts Anthropology, 12*(2), 50-59.

Adam, M., Tyszkowski, S., & Smaruj, M. (2011). The contest effectiveness of the men's national judo team of Japan, and character of their technical-tactical preparation during the World Judo Championships 2010. *Baltic Journal of Health and Physical Activity, 3*(1), 65-74. 10.2. https://doi.org/10.2478/v10131-011-0007-3

Adams, N. (1993). *Kumi-kata*. Chiron.

Adolf, V.A., Sidorov, L.K., Kudryavtsev, M.D., Osipov, A.Y., & Bliznevsky, A.Y. (2018). Precompetitive fitness methods applied by Russian judo teams prior to international events. *Teoriya i praktika fizicheskoy kultury, n°9*, 66-68. http://www.teoriya.ru/ru/node/9431

Ahmedov, F., Gardašević, N., Setiawan, E., Olimov, A., Muqimov, O., Komilov, J., . . . Yusupov, R. (2024a). Comparison of technical and tactical parametres for Elite judo athletes based on weight and gender categories. *Revistalberoameriícana de psicologia del ejercicio y el deporte, 19*(5), 502-506.

Ahmedov, F., Monterrosa-Quintero, A., Kiyamov, N., Norboyev, K., Ashurov, A., & Tursunku1lov, E. (2024b). Technical-tactical profile and winning probability analysis of elite uzbek judoka Davilat Bobonov. *Revista Iberoamericana de psicología del ejercicio y el desporte, 19*(2), 242-244.

Ahmedov, F. (2020). The relationship between the weight classes and competitive activity of judo athletes. *International Journal of Physical Education, Sports and Health, 7*(4), 108-111.

Ait Ali Yahia, A. (2023). The effectiveness of tactical actions on the offensive system of male elite judo athletes in Olympic tournaments. *The Arts and Sciences of Judo, 3*(1), 13-22.

Ait Ali Yahia, A. (2021). Contribution of Nage-waza actions to the Olympic performance: an observational 2004-2016 medalists' study. *International Journal of Martial Arts, 7*(1), 20-35. https://doi.org/10.51222/injoma.2021.03.7.20

Ait Ali Yahia, A. (2015). *The athletic performance of judo combat at the Olympic Games as a frame of reference for the know-how and decisional knowledge of high-level judokas [Unpublished doctoral dissertation]*, University of Algiers 3.

Aitken, G. (2010, May 01). Martial arts fighting styles An introduction. https://ezinearticles.com/expert/Dr._Geoff_Aitken,_Ph.D./294331

Akhmedov, F.K., Abdulakhatov, A.R., & Akhmedov, F.S. (2020). *Competitive activity analysis for the skilled judo athletes by weight categories. Scientific theory journal Uchenye zapiski universiteta imeni P.F. Lesgafta, n°5* (183), 37-43. https://doi.org/10.34835/issn.2308-1961.2020.5

Alexandre, M. (2006, March). Analyse technique du tournoi de Paris. *Judo magazine, n°231*.

Appadurai, A. (1996). Playing with modernity: The decolonization of Indian Cricket'. *In Modernity at large: cultural dimensions of globalization* (pp. 89-113). Minnesota University Press.

Assunção, M.R. (2014, Jan-Mar). Capoeira circle or sports academy? The emergence of modern styles of capoeira and their global context. *História, Ciências, Saúde-Manguinhos, 21*(1), 135-149. https://doi.org/10.1590/S0104-59702014005000002

Bagińska, J., Piepiora, P., Piepiora, Z., & Witkowski, K. (2022). The geography of Olympic combat sports - part one: judo, karate, taekwondo. *Archives of Budo, vol.18*, 183-192.

Barreto, L.B.M., Aedo-Munoz, E.A., Sorbazo Sotto, D.A., Miarka, B., & Brito, C.J. (2022, January-June). *Judo combat time, scores, and penalties: Review of competition rules changes between 2010 and 2020*. Revista de Artes Mar-

ciales Asiáticas, 17(1), 19-37. https://doi.org/10.18002/rama.v17i1.7122

Barreto, L.B.M., Aedo Muñoz, E.A., Sorbazo Sotto, D.A., Miarka, B., & Brito, C.J. (2021). Road to Tokyo Olympic Games: do new judo rules change the technical-tactical behaviour of elite male athletes? *International Journal of Performance Analysis in Sport, 21*(3), 1-9. https://doi.org/10.1080/24748668.2021.1979839

Blais, L., & Trilles, F. (2004). Analyse mécanique comparative d'une même projection de judo: Seoi-nage, réalisée par cinq experts de la Fédération Française de Judo. *Sciences et motricité, n°51*, 49-68.

Boguszewski, D. (2011). Relationships between the rules and the way of struggle applied by top world male judoists. *Archives of Budo, 7*(1), 27-32.

Boguszewski, D. (2006). Fight Dynamics of the Double Olympic Champion in Judo (1988, 1992). *Journal of Human Kinetics,vol.16*, 97-106.

Boguszewski, D., & Boguszewska, K. (2006). Dynamics of judo contests performed by finalists of European Championships (Rotterdam 2005). *Archives of Budo, vol.2*, 40-44.

Brett, J., & Scott, A. (1998). European judo is really japanese sombo? *The History of Sombo*. Stratford Sombo Academy.

Brousse, M. (2024). The meaning of the judo rules. *The Arts and Sciences of Judo, 4*(2), 46-53.

Brousse, M. (2003). Identité et culture du judo international: entre traditions et modernité. Les Cahiers de l'INSEP (hors serie), In P. Simonet P & L.Véray (Eds), *L'Empreinte de Joinville, 150 ans de sport* (pp. 235-249).

Brousse, M., & Matsumoto, D.R. (1999). *Judo: A sport and way of life*. International Judo Federation.

Burns, A., Rosenblatt, B., & Macdonald, A. (2018). Physical preparation for judo. In M. Callan (Ed), *The science of judo* (pp. 120-129). Routledge.

Bury, A., & al. (2004, September). Makarau, le lutteur. *Judo magazine*.

Calmet, M., & Pierantozzi, E. (2021). Gender and perspectives on training and techniques: Analyses of the system of attacks in standing up position. *The Arts and Sciences of Judo, 1*(1), 6-13.

Calmet, M., Pierantozzi, E., Sterkowicz, S., Takito, M.Y., & Franchini, E. (2018). Judo rules:searching for a wind of changes. *International Journal of Performance Analysis in Sport, 17*(6), 863-871. https://doi.org/10.1080/24748668.2017.1405612

Calmet, M. (2010). Analyse des combats lors des compétitions de haut. In T. Paillard (Ed), *Optimisation de la performance sportive en judo* (pp. 263-287). De Boeck Université.

Chernozub, A., Korobeynikov, G., Mytskan, B., Korobeinikova, L., & Cynarski, W. (2018). Modelling Mixed Martial Arts Power training needs depending on the predominance of the strike or wrestling fighting style. Ido Movment for Culture. *Journal of Martial Arts Anthropology, 18*(3), 28-36.

Chesterman, B. (2004, August 30). Japanese domination masks full story. Reuters News.

Chovaux, O. (2005). D'un jeu barbare à un jeu intelligent. Les mutations des styles de jeu du football nordiste (1880-1932). *STAPS, 3*(65), 111-122.

Clot, Y., & Faita, D. (2000). Genres et styles en analyse du travail. Concepts et méthodes. *Travailler,vol. 4*, 7-42.

Cynarski, W. (2025). Sambo as a form of wrestling and self-defense. Sport i Turystyka. *Środkowoeuropejskie Czasopismo Naukowe, 8*(1), 63-76. http://doi.org/10.16926/sit.2025.01.03

De Paula Lima, P.O., Almeida Lima, A., Sampaio Coelho, A.C., Lopes Lima, Y., Leão Almeida, G.P., Almeida Bezerra, M., & De Oliveira, R.R. (2017). Biomechanical differences in Brazilian jiu-jitsu athletes: The role of combat style. *The International Journal of Sports Physical Therapy, 17*(1), 67-75.

Dimitrova, N. (2020). Major trends in the World judo sport development. *Trakia Journal of Sciences, 18* (supp 1), 848-853. http://doi.org/10.15547/tjs.2020.s.01.138

Doppelhammer, F., & Stoeckl, M. (2020). Effects of the 2017/18 rule changes in fight duration, fight decisions, scores, penalties, and attempts in judo, based on systematic competition analysis of the World Championships 2015 and 2018. *International Journal of Performance Analysis in Sport, 20*(6), 1061-1071. http://doi.org/10.1080/24748668.2020.1827565

Dzhumakhonovich, A.V. (2020). The factors causing individual style of activity of highly skilled boxers. *European Journal of Research and Reflection in Educational Sciences, 8*(1), 71-75.

FFJDA. (1985). *Le judo de 15-17 ans, Pratique et entraînement*. FFJDA.

Fouquet, A. (2019). *Ce que la boxe montre de l'homme. Transversalités, n°149*, 25-39.

Franchini, E. (2014). Born to fight? Genetics and combat sports. *Revista de Artes Marciales Asiáticas, 9*(1), 1-8.

Franchini, E., Del Vecchio, F.B., Matsushigue, K.A., & Artioli, G.G. (2011). Physiological profiles of elite judo athletes. *Sports Medicine, vol.41*, 147-166. https://doi.org/10.2165/11538580-000000000-00000

Gardasevic, N., & Stankovic, N. (2019). The most frequently used judo techniques in accordance with current sport rules. In Faculty of Physical Education and Sports (Ed.), *Book of Proceedings Fis communications 2019* (pp. 55-59). University of Nis.

Gaudin, B. (2009). La codification des pratiques martiales. Une approche socio-historique. *Actes de la recherche en sciences sociales, 4*(179), 4-31.

Gleeson, G. (1967). *Judo for the West*. A.S. Barnes and Company.

Gulyayeva, A.C. (2016). *Japanese judo in the Soviet Ukraine (the 1960s - 1970s): the image in youth and sports press. Scientific-theoretical almanac «Grani», 138*(10), 117-122. https://doi.org/10.15421/ 1716130

Hammami, N., Frih, B., Rahali, H., Mkacher, W., Rezgui, T., Čular, D., & Bouassida, A. (2021). Effects of taekwondo style practice on cardiac remodeling and isokinetic thigh strength in elite women players. *Science & Sports, 36*(6), 479.e1-479 e9. https://doi.org/10.1016/j.scispo.2020.10.012

Heinisch, H.-D., Oswald, R., Ultsch, D., Bazynski, M., Leonhardt, S., & Büsch, D. (2017). *Analyse der Olympischen spiele 2016 im judo und entwicklungstendenzen im Olympiazyklus 2012-2016. In J. Wick, D. Büsch, & I. Seidel (Eds), Olympiaanalyse Rio 2016: Olympiazyklusanalysen und Auswertungen der Olympischen Spiele 2016* (pp. 294-312). Meyer & Meyer Verlag.

Heinisch, H. D., Oswald, R., Ultsch, D., Bazynski, M., Birod, M., & Büsch, D. (2013). Analyse der Olympischen Spiele 2012 im Judo . *Zeitschrift für Angewandte Trainingswissenschaft , 19*(2), 121-150.

Heinisch, H.D., & Oswald, R. (2007, September 12). Features of the technical tactical performance capacity of the world's top judoka [Poster presentation]. *Annals of the 5th International Judo Federation World Research Symposium, Rio de Janeiro, Brazil.*

Hilpron, M., & Rosselin, C. (2010). The bodily experience of judo and the globalisation of sport: A comparison of France and Japan. *Journal des anthropologues, n°120-121*, 1-14 https://doi.org/10.4000/jda.4319

Holden, M. (2012, August 04). Olympics-Judo-Japanese fear supremacy on the mat is over. https://www.reuters.com/article/oly-judo-jap-day8-idUSL6E8J2HSI20120804

Iermakov, S., Tropin , Y., & Ponomaryov, V. (2015). Ways to improve the technical and tactical skills wrestlers Greco-Roman style of different manners of conducting a duel. *Slobzhansky Herald of Science and Sport, 49*(5), 38-41.

Inman, R. (2010). Contest judo innovations. In British Judo Association (Ed),*Technical conference presentation, Leicester, England.*

Inman, R. (2005, September). Shin-Kokusai-Shiaiwaza (Classification of innovative international competition techniques) [Poster presentation]. *4th International Judo Federation World Judo Research Symposium, Cairo, Egypt.*

IJF. (2022). *2022-2024 IJF Judo Rules Information*. https://www.ijf.org/news/show/judo-rules-olympic-cycle-2022-2024

IJF. (2013). *Refereeing new rules*. https://www.ijf.org

IJF. (2010). *Refereeing new rules*. https://www.ijf.org

Inzirillo, C., & Bournois, F. (2009). *L'intelligence sportive au service du manager*. Groupe Eyrolles.

Ito, K., Hirose, N., & Maekawa, N. (2019). Characteristics of re-gripping techniques preceding scored throws in international-level judo competition. *Central European Journal of Sport Sciences and Medicine, 25*(1), 43-50. https://doi.org/10.18276/cej.2019.1-05

Kajmovic, H., Karpljuk, D., Kapo, S., & Simenko, J. (2022). *Comparison of individual penalties according to gender and weight categories of Elite judo athletes from four World Championships. Biology, 11*(9, article 1284), 1-11. https://doi.org/10.3390/biology11091284

Kajmovic, H., & Huremovic, D. (2019, June 13-14). *Analysis of unsuccessfully performed throwing techniques by senior male competitors at Bosnia and Herzegovina state Championship. In H. Sertić, S. Čorak, & I. Sagedi (Eds), Applicable research in judo* (pp. 55-59). University of Zaghreb Faculty of Kinesiologie.

Kano, J. (1986). Kodokan Judo. Kodansha International Ltd.

Kanthack, T.F.D., Guillot, A., Simon, I., & Di Rienzo, F. (2022). Evaluating the effect of the combat style congruency on performance and fatigability in Brazilian jiu-jitsu: *A pilot study. International Journal of Sports Physiology and Performance, 17*(5), 726-732. https://doi.org/10.1123/ijspp.2021-0156

Kashiwagura, D.B., Courel-Ibáñez, J., Kashiwagura, F.B., Agostinho, M.F., & Franchini, E. (2023). Diff erences in Judo Attack Systems Between Weight Categories. *Journal of Science in Sport and Exercise, vol.5*, 263-273. https://doi.org/10.1007/s42978-022-00179-9

Katicips, L.F., Silva Júnior, J.N., Kons, R.L., & Detanico, D. (2018, October). Impact of different judo rules: analysis of scores and penalties in Paris Grand Slam Championships. *Revista Internacional de Ciencias del Deporte, 14*(54), 334-343. https://doi.org/10.5232/ricyde

Kawaishi, M. (1963). *Ma méthode de judo*. Judo International.

Ko, W.Y., Yang, J.J., Hsu, C.Y., Hsieh, P.L., & Chien, C.Y. (2022). How judo professionals win and lost in competition: A closer look at gender, weight, technique, and gripping. *Annals of Applied Sport Science, 10*(4), 1-8. https://doi.org/10.52547/aassjournal.1093

Koizumi, G. (1960). My study of judo. *The principles and the technical fundamentals*. Sterling Publishing Co.

Korobeynikov, G.V., Aksutin , V.V., & Smoliar, I.I. (2015). Connection of boxers' combat styles with psycho-physiological characteristics. *Pedagogics, psychology, medical-biological problems of physical training and sports, 19*(9), 33-37. http://doi.org/10.15561/18189172.2015.0905

Kozina, Z.L., Jagiello, W., & Jagiello, M. (2015). Determination of sportsemen's individual characteristics with the help of mathematical simulation and methods of multi-dimentional analysis. *Pedagogics, psychology, medical-biological problems of physical training and sports, 19*(12), 41-50. http://doi.org/10.15561/18189172.2015.1207

Kozin, Y., Belevtsov , M., Pustomelnyk, O., & Kozina , Z. (2022). Determination of fighting styles of qualified athletes in modern martial arts based on a multidimensional analysis of biomechanical and psychophysiological indicators. *In Z. Kozina (Ed.), Collection of articles of the XV International Scientific Conference. Health saving technologies, rehabilitation and physical therapy, 3*(1), 53-59. https://doi.org/10.34142/HSR.2021.07.04.02

Lampe, N., Kajmović, H., Šimenko, J., & Bečić, F. (2022). The Effects of judo rule changes on contestants' performance: Paris Grand Slam case study. *The Arts and Sciences of Judo, 2*(2), 56-65.

Latyshev, S., Korobeynikov, G., & Korobeinikova, L. (2014). *Individualzation of training in wrestlers. International Journal of Wrestling Science, 4*(2), 28-32.

Levitsky, A.G, Rudenko, G.V., & Simakov, D.A. (2020). Skills-specific tactical fight control algorithms in judo. *Theory and Practice of Physical Culture, n°4*, 80-82. http://www.teoriya.ru/en/node/13087

Lincoln, H. (2015, January). The evolution of the no-leg-grab rules at IJF Judo competition from 2010 to present. http://www.judolink.club/2010-2016-IJF-no-leg-grab-rules.html

Loio Pinto, F.C., Neiva, H.P., Nunes, C., Branquinho, L.C., & Ferraz, R. (2020). Ultimate Full Contact offensive efficiency analysed through styles and combat distances: a confluence of cognitive and ecological approaches. *Archives of Budo Science of Martial Arts and Extreme Sports, 16*, 17-27.

Ma, C. (2023). An analysis of weight and fighting styles as predictors of winning outcomes of elite mixed martial arts athletes. *The Sport Journal, vol.24*, 1-13.

Manuatu, B.J. (2023). Enemy at the Gates: Soviet Sambo and the US Martial Arts Community, 1964–1980. *The International Journal of the History of Sport, 40*(8), 680-698. https://doi.org/10.1080/09523367.2023.2226084

Marionda, I.I., Samoilenko, O.I., Anatskyi, R.V., Leonenko, A.V., Cherednichenko, S.V., & Krasilov, A.D. (2023). Features of the technical and tactical arsenal of highly qualified athletes (men and women) who specialize in judo. Scientific Journal of National Pedagogical Dragomanov University. *Physical culture and sports, vol.2*, 25-33. https://doi.org/10.31392/NPU-nc.series15.2023.02(160).05

Martin, P. (1948). Le sport et l'homme. *Principes de pédagogie sportive*. Éditions du Haut-pays.

Martinkova, I., & Parry, J. (2016). Martial categories: Clarification and Classification. *Journal of the Philosophy of Sport, 43*(1), 143-162. http://doi.org/10.1080/00948705.2015.1038829

Miller, G.A., Collins, N. A., Stewart, M. J., & Challis, D. G. (2015). *Throwing technique and efficiency in the 2013 British Judo Championships. International Journal of Performance Analysis in Sport, n°15*, 53-68. https://doi.org/10.1080/24748668.2015.11868776

Mirallès, P. (2007). La gestion des talents: émergence d'un nouveau modèle de management ? *Management & Avenir, 1*(11), 29-42.

Miyake, K., Sato, T., & Yokoyama, T. (2016). Effects of the international judo federation refereeing rules on the match results and points in the All-Japan Judo Championships. *Archives of Budo, vol.12*, 133-139.

Moronta, D., Ojeda-Aravena, A., Dopico-Calvo, X., Kons, R., Calvo-Rico, B., & García-García, J. (2025). Match-related technical performance of high-level technical judo athletes during the 2016–2020 Olympic Games: an analysis by phase and weight category. *International Journal of Performance Analysis in Sport, 1-10*. https://doi.org/10.1080/24748668.2025.2499330

Nishioka, H. (2010). Training for Competition: Judo: Coaching, Strategy and the Science for Success. Black Belt Communications.

Ogawa, G. (2011, November 19). A new mission for Kosei Inoue. http://www.judo-voj.com/contents/inouekosei.html

Ogawa, G. (2009, April 24). Japan's new head of Judo, Haruki Uemura, talks about his thoughts. http://www.judo-voj.com/contents/harukiuemura.html

Ono, S. (2025). About Shohei Ono. https://onodojo.eu/about/

Osipov, A., Kudryavtsev, M., Aldiabat, I., Sweidan, A., Galimova, A., Zakharova, L., . . . Tyupa, P. (2023). *Important components of competitive performance in elite male judokas in the heavyweight category. Journal of Physical Education and Sport, 23*(4, article 105), 831-836. http://doi.org/10.7752/jpes.2023.04105

Petrov, P. (2014). National styles of wrestling in the Soviet Union and the Post-Soviet states: Political and sociocultural aspects of their development and use. *The International Journal of the History of Sport, 31*(4), 405-422. http://doi.org/10.1080/09523367.2013.869215

Petrov, R. (1984). *Lutte libre et lutte gréco-romaine*. FILA.

Pickering, M. (2019, March 31). The man behind the Khabareli. https://www.ijf.org/news/show/Khabareli?

Pityn, M., Okopnyy, A., Tyravska, O., Hutsul, N., & Ilnytskyy, I. (2017). Dynamic of indexes of technical and tactical actions of qualified kickboxer individual fighting style. *Journal of Physical Education and Sport, vol.17* (Suppl. 3, Art 157), 1024-1030. https://doi.org/10.7752/jpes.2017.s3157

Prystupa, E., Okopnyy, A., Hutsul, N., Khimenes, K., Kotelnyk, A., Hryb, I., & Pityn, M. (2019). Development of special physical qualities skilled kickboxers various style of competitive activity. *Journal of Physical Education and Sport, vol.19* (Suppl. 2, Art 41), 273-280. https://doi.org/10.7752/jpes.2019.s2041

Quidet, C. (1983). *La fabuleuse histoire des Arts Martiaux*. Éditions O.D.I.L

Reay, T. (1985). Judo: Skills and techniques. The Crowood Press.

Roux, P. (1990). Contribution to the analysis of the transition: standing to ground fighting. [Unpublished dissertation], INSEP.

Rudenko, G.V., Izotov, E.A., Levitsky, A.G., & Avakyan, A.G. (2023). Influence of current refereeing rules on the content of competitive activity of judokas. *Theory and Practice of Physical Culture, n°3*, 65-67. https://doi.org/http://www.tpfk.ru

Sacripanti, A. (2013a). Judo Match Analysis a powerful coaching tool: basic and advanced tools in a fighting style. Italian judo scientific conference. Rome, Italy. https://doi.org/10.48550/arXiv.1308.0457

Sacripanti, A. (2013b). Kumi Kata: From dojo to high level competition. International Judo Federation

Sacripanti, A. (2010). Advances in judo biomechanics research: Modern Evolution on Ancient Roots. VDM verlag.

Sacripanti, A. (1987). Biomechanical classification of judo throwing techniques (Nage Waza). In L. Tsarouchas, J. Terauds, B. A. Gowitzke, L. E. Holt (Eds.), *5th International Symposium of Biomechanics in Sport* (pp. 181-194), Athens, Greece. https://ojs.ub.uni-konstanz.de/cpa/article/view/2314/2187.

Samuel, R.D., Basevitch, I., Wildikan, L., Prosoli, R., & McDonald, K. (2019). Please stop changing the rules! the modifications of judo regulations as a change-event in judokas' and coaches' careers. *Sport in Society, 23*(4), 774-794. https://doi.org/10.1080/17430437.2019.1669911

Santos, L., Fernández-Río, J., Almansba, R., Sterkowicz, S., & Callan, M. (2015). Perceptions of top-level judo coaches on training and performance. *International Journal of Sports Science and Coaching, 10*(1), 145-158. https://doi.org/10.1260%2F1747-9541.10.1.145

Sato, S. (2013). The sportification of judo: global convergence and evolution. *Journal of Global History, 8*(2), 299-317. https://doi.org/10.1017/S1740022813000235

Sato, S. (2004, August 18). Zviadauri proves Georgia's judo strength. AFX International Focus.

Scott, S. (2012). The Kharbarelli pick up: How and why this throwing technique works. *Revista de Artes Marciales Asiáticas, 3*(3), 54-57. https://doi.org/10.18002/rama.v3i3.376

Sergeevich, I.V. (2022, October 12). Prospects of Sambo at the present stage. *Practice Oriented Science: UAE - Russia - India* (pp. 31-36). UAE: Scientific publishing house Infinity.

Sertić , H., Cetinić , M., & Segedi, I. (2016, 20-21 June). Techical Analysis of Croatian national Championship for seniors. In H. Sertić, S. Čorak, & I. Segedi (Ed.), *Applicable research in judo*, (pp. 55-58). Poreč

Sertić, H., Segedi, I., & Lindi, H. (2010, April 21). European, Brazilian and Japanese judo fighting style [Poster presentation]. In EJU (Ed), 1st European Science of Judo Symposium, Vienna, Austria.

Sikorski, W. (2005). Changing judo in changing Europe on the identity of combat sports in the era of integration and globalization. *Archives of Budo, vol.1*, 27-30.

Silva Batista, M., Silva, C., Torres, D., Conceição, A., Borrego, C., & Louro, H. (2024). Predominant technical actions used in the European judo championship. *Retos, n°60*, 877-885. https://doi.org/10.47197/retos.v60.107361

Soriano, D., Tarrago, R., Lapresa, D., Callan, M., & Iglesias, X. (2024). Observation system for the technical-tactical analysis of judo by the Rio 2016 Olympic champions. *PLoS ONE, 19*(5), 1-14. https://doi.org/10.1371/journal.pone.0303689

Stanković, N., Cuk, S., Milosevic, N., & Stamenkovic, S. (2015). The course of the judo fight at the 2011 World Championship. *Physical Education and Sport, 13*(1), 107-113.

Sovetova, V. (2015, August 31). Olympic Champion 1984: Russian judokas are serious rivals for the Japanese at the 2016 Games. Tass Russian News Agency. https://tass.ru/sport/2222191

Szczepanik, K., Lech, G., Witkowski, K., Jaworski, J., Pałka, T., & Piepiora, P. (2023). Differences in technical and tactical training of the world's leading national teams in judo tournaments in 2017-2018. *Archives of Budo, vol.19*, 1-9.

Takahashi, M., & al. (2005). Develop effective judo strategies and tactics. Mastering judo. Human Kinetics.

Tanguy, P. (2014). Wrestling styles and the cultural reinterpretation process. *The International Journal of the History of Sport, 31*(4), 492-508. https://doi.org/10.1080/09523367.2013.869218

Tehran Times. (2018, 23 September). Iran's Mollaei makes history at World Judo Championships. https://www.tehrantimes.com/news/427772/Iran-s-Mollaei-makes-history-at-World-Judo Championships

Tropin, Y., Latyshev, M., Saienko, V., Holovach, I., Rybak, L., & Tolchieva, H. (2021). *Improvement of the technical and tactical preparation of wrestlers with the consideration of an individual combat style. SportMont, 19*(2), 23-28. https://doi.org/10.26773/smj.210604

Vermeir, K., & Reynier, V. (2007). Style de pratique, sentiment d'appartenance communautaire et représentations sociales du risque en stations de sports d'hiver. In C. Royer (Ed.), *Loisir et société, 29*(2), pp.347-376.

Witkowski, K., Maśliński, J., & Kotwica, T. (2012). Analysis of fighting actions of judo competitors on the basis of the men's tournament during the 2008 Olympic Games in Beijing. *Journal of Combat Sports and Martial Arts, 3*(2), 121-129. https://doi.org/10.5604/20815735.1047659

Article history:
Received: 09 July, 2025
Accepted: 20 October, 2025

Speciality Judo Training of Deaf Judoka (Kata)

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Abstract: *Along with the global spread of judo, a phenomenon has emerged: the distortion of the primary goal of this martial art, which is harmonious physical and spiritual development. The pursuit of Olympic medals has led to extreme overspecialisation on an unprecedented scale. This article aims to highlight a reduction in the technical repertoire used in modern Olympic judo competitions. According to a survey conducted by the Russian Judo Federation, 2016-2017, approximately 73% of coaches lack a command of the fundamental principles and basic techniques of judo. As a solution, this paper proposes focusing on judo kata as a fundamental method for mastering judo techniques. Using video analysis and statistical processing of the obtained data, we analysed the performances of 25 pairs of deaf judoka (members of the national teams of Turkiye, France, Russia, Ukraine, Belgium, Bulgaria, Iran, Poland, Venezuela, etc.) who participated in the Nage-no-Kata competition at world championships and Deaflympics from 2012 to 2024. The qualitative assessment revealed that even toptier athletes possess a narrow spectrum of technical actions. The technical elements most prone to errors during execution were identified. Recommendations for coaches were developed to improve the quality of judo training, one of which is the necessity of including judo kata in training pro-grammes for deaf athletes.*

Keywords: *deaf athletes; Nage-No-Kata; martial arts; Deaflympics; judoka*

According to the World Health Organization, approximately 466 million people worldwide are affected by some degree of hearing loss that impacts their daily lives (World Health Organiza-tion, 2025). For many years, disability was considered primarily from a medical perspective, defined as a deviation from the norm that worsened an individual's condition (Townsend et al., 2016). This reductionist biological approach was criticised for disregarding other aspects of disability. Recently, a model focusing on human rights and fundamental freedoms has been developed, promoting participation in sports and stimulating research into the lived experiences of athletes with disabilities (Townsend et al., 2016). Investigators (Irish et al., 2017) have demonstrated the positive psychological and social impact of participation in sporting events for deaf athletes.

Judo, founded by the Japanese educator and humanist Jigoro Kano, is a type of Asian martial art. In the modern world, judo has gained widespread popularity as a form of jacket wrestling and an Olympic sport. Currently, it is estimated that 28 million people practise judo across 204 countries. First introduced as an Olympic sport at the 1964 Tokyo Games, judo returned to its birthplace for the 2021 Olympics. With close to 30 million practitioners worldwide, its popularity is expected to keep growing (Tadao Otaki & Donn Draeger, 1990).

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However, alongside the global spread of judo, there has been a distortion of Jigoro Kano's primary goal for this martial art: the harmonious physical and spiritual development of students. Despite a history spanning over 130 years, judo for people with disabilities was only officially introduced at the Paralympic Games in 1988, for men, and 2004 for women (Irish et al, 2017). The International Committee of Sports for the Deaf (ICSD) officially recognised judo in 2009. Deaf athletes first had the opportunity to compete in judo at the XXI Summer Deaf-lympics (SDG) in Chinese Taipei (Emelyanov, 2015). Judo was included in the programme of these SDGs as one of three martial arts, collectively termed 'Martial Arts for the Deaf' (MAFD). Currently, MAFD includes the following sports, in order of increasing popularity: judo, karate (WKF), and taekwondo (WTF).

In 2009, Russian *judoka* did not win gold medals at the SDG. This is unsurprising, given that deaf athletes had been practising in the MAFD framework worldwide for over 40 years, since 1979 (Emelyanov, 2015).

Following the 2002 Russian Championships in Moscow, the XII World Martial Arts Championship for the Deaf was held under the auspices of the IMAFD at the Izmailovo Sports Palace from 19th to 23rd May 2004. This event marked the first participation of Russian deaf athletes and featured 11 medal events (Emelyanov, 2015). Until 2017, world championships (WC) and European championships were held solely within the MAFD framework. Beginning in 2019, decisions were made to organise high-level international competitions specifically for judo. The first European Judo Championship for the deaf was held in Belgium in the autumn of 2019, and the World Championship was held in France in the spring of 2021. Currently, 17 medal events are typically contested in deaf judo (Table 1).

Table 1. Statistics for Participants at World Deaf Judo Championships and Summer Deaflympics Games (SDG) from 2008 to 2024

	Events							
	2008 (WC)	2009 (SDG)	2012 (WC)	2013 (SDG)	2016 (WC)	2017 (SDG)	2021 (WC)	2024 (WC)
Number of countries	15	22	17	25	15	33	26	21
Number of participants (men and women)	68	67	68	102	43	151	164	120
The number set of awards	15	10	17	17	16	19	17	17

The number of medal events in judo increased gradually. The programme of the 14th WC in 2012 (Nueva Esparta, Venezuela) included team competitions and Kodokan judo *kata* (*Nage-no-Kata*). Table 1 provides information on the three most recent Deaflympic cycles (number of participants and medal events).

As of the end of 2024, 600 individuals were officially training in deaf judo in the Russian Federation, accounting for 55% of all persons with disabilities involved in martial arts for the deaf (Emelyanov, 2015). The popularity of judo, compared to other martial arts for the deaf, can be attributed to the extensive network of sambo schools in Russia and the former Soviet Union. Sambo, a combat sport created, based on judo, by V. Oshchepkov at the Department of Theory and Methodology of Martial Arts of the GTSOLIFK Institute (Moscow) in the 1930's, shares common roots (Aleksey Gorbylev, 2017). Following the 12th World Deaf Martial Arts Championships in Moscow in 2004, many sambo (A. Petukhov, V. Pegov, A. Chaynikov, etc.) and Greco-Roman wrestling (R. Valeev, L. Bogdanov) coaches began training deaf athletes for judo competitions. The specificity of sambo and other wrestling styles has influenced the quality and types of techniques used in these newly formed judo groups. This study aims to examine the processes associated with the reduction of technical repertoire used in modern deaf judo competitions. As a solution to this problem, we refer to the main judo kata - the throwing *kata* (*Nage-no-Kata*) - as one of the principal methods of mastering judo technique.

As mentioned, at the last two SDGs, a *kata* medal event (*Nage-no-Kata*) was added to the traditional set of competitions. Unfortunately, Russian deaf athletes did not win a medal in this traditional form of the judo programme, which is fundamental for Europeans and Japanese. Considering the future international competitions, 2019-2021, it is relevant to investigate the reasons for the lag of Russian judoka in this area of training and to develop practical recommendations for coaches to improve the techniques of deaf judo athletes. The Deaflympics were chosen for this study because they are the only major event where competitions in both *kata* and *shiai* are held simultaneously for this group of athletes. Various methods are used to study techniques in martial arts, with the most common being *kata* and *randori* (Brian N. Watson & Kano, 2009, et al.).

Randori is free-style practice or training where an athlete hones their skills against a freely moving opponent. "*Randori*, meaning 'free practice,' is conducted under the current IJF competition rules. It includes throwing, strangles, pinning techniques and joint locks applied to the elbow. Participants may use any techniques they know, provided they do not injure their partner, and adhere to the rules of judo etiquette." (Watson, 2019; Kano, 2013; Pfeiffer & Bauer, 2009). The difference between *randori* and *shiai* (competition fights with refereeing) or sparring in the *dojo* is that the partner offers less resistance during technique attempts. In its pure form, *randori* can last indefinitely without exhausting either *judoka*, primarily operating in an aerobic mode, occasionally shifting to anaerobic during a throw.

Kata is translated as 'form' or formal exercise. Through thousands of repetitions, an athlete brings the movement to an instinctive level. The body operates automatically based on conditioned reflexes developed through years of training. Currently, Kodokan judo comprises 7 offi-cial *kata* (Tadao Otaki & Donn Draeger, 1990; Brian N. Watson, 2019; Kawaishi, M., 1982). However, in the USSR and Russia, the study of *kata* was largely neglected until recently. Even in the research materials of Vasily Oschepkov, a Kodokan graduate and second dan, and the founder of Soviet judo, there is no mention of kata (Emelyanov, V. Yu., 2015; Emel-yanov, V. Yu., & Chainikov, A. P., 2017; Kulanov, A. E., 2017). The first European kata championship was organised by the IJF in London in 2005.

Kata was officially included in the programme of the World Deaf Judo Championships in 2012 and has been part of the Summer Deaflympics Games since 2013 (Table 2).

Table 2. Kata (*Nage-no-Kata*) Events Statistics From the World Deaf Judo Championships (WC) and Summer Deaflympics Games, 2012 to 2024.

	2012 (WC)	2013 (SDG)	2016 (WC)	2017 (SDG)	2021 (WC)	2024 (WC)
Number of countries	3	4	4	8	7	5
Number of pairs (men and women)	8	12	8	10	8	6

In November 2025, Tokyo hosted the 25th Summer Deaflympics. However, the judo competi-tion organisers decided to exclude two of the most popular and traditional judo events: the open weight category and *kata*. Unfortunately, our arguments and official appeals to the Deaflympics Organising Committee, the All Japan Judo Federation, the Japanese Deaf Sports Federation, and the ICSD Judo Technical Director were left unaddressed.

To study and demonstrate *kata*, an athlete must reach a certain level of maturity and be physically and technically prepared. Demonstrating kata reveals gaps in an athlete's preparation. However, deaf judoka face specific difficulties related to their co-ordination abilities when studying and demonstrating certain kata techniques (Emelyanov, V. Yu., 2016). Co-ordination is crucial in *kata* performance, as it determines parameters such as movement proportionality relative to spatial references, rhythm, orientation and movement direction (Emelyanov, V. D. et al., 2014). Many researchers have proven a connection between vestibular dysfunction and pathology of the auditory analyser, affecting activities relying on kinesthetic function. The reduced functional activity of the vestibular analyser in deaf people is also characterised by decreased statokinetic stability (Emelyanov, V. D. et al., 2014). When performing cer-tain kata techniques where *tori* stands on one leg, the movement must be proportionate to the ability to maintain the posture. The ability to maintain correct body posture against gravitational forces depends on the co-ordinated interaction of the vestibular system, muscular apparatus and the central nervous system.

METHODS AND ORGANISATION OR RESEARCH

Numerous studies have been devoted to analysing athlete techniques in *shiai*. Statistics provided in Emelyanov, V. Yu., & Chainikov, A. P. (2017) for deaf judoka participating in the 2016 national championship showed that athletes have a narrow range of technical actions.

A distinctive feature of deaf judo (unlike Paralympic judo and mainstream judo) is the inclusion of kata in the programmes of world championships and the Summer Deaflympics Games. Jigoro Kano explained the abstract nature of kata as a means of evaluating skills. He particularly emphasised the great practical importance of *kata* for the training process, as technical difficulties encountered in randori could often be overcome by breaking down techniques into their constituent elements (Tadao Otaki & Donn Draeger, 1990; Jigoro Kano, 2009). Judoka interact as follows during kata practice for technical development:

- *Uke* (the judoka receiving the technique) develops and improves ukemi (breakfalls).
- *Tori* (the judoka performing the technique) develops and improves throwing technique.

Diminishing the role of *uke* during kata demonstration leads to a random sequence of poorly connected elements. Understanding the direction, movement and rhythm specific to each technique helps structure and emphasise power accents. *Kata* is an idealised demonstration of judo techniques without the confounding factors of a contest (e.g., psychological pressure). Fighting techniques in all martial arts were traditionally practised in the form of *kata*; this aspect is not explored further in this article.

This study aims to elucidate the reasons for the lag of Russian deaf judoka in international *kata* competitions. Understanding these reasons will help formulate practical recommendations for coaches to eliminate *kata* errors. We reviewed the performances of highly qualified deaf judoka in *Nage-no-Kata*. The quality of judo technique performance by participants of the 2013 SDG (Sofia, Bulgaria) and the world championships in 2012, 2016 and 2021 was assessed. A total of 25 judoka pairs (leaders of national teams from 12 countries, as well as a Russian pair participating in Russian championships from 2015 to 2019) were analysed. This study employed video analysis and statistical processing of the obtained data. The evaluation of the technical actions analysed in the pairs was conducted according to the criteria outlined in the International Judo Federation (IJF) rules for *kata* (International Judo Federation, 2019).

The analysis identified the main types of errors for each of the 15 techniques in *Nage-no-Kata*. The maximum number of errors for the seven couples considered, according to the IJF Rules, is 202 points (taken as 100%). In this study, all errors were added regardless of their severity rank, as the primary aim was to determine the quantitative aspect of technical knowledge (techniques) in judo rather than the qualitative level of proficiency (i.e., who is bet-ter); in other words, to determine the breadth of mastery of various judo techniques by deaf judoka.

The obtained data and the statistical analysis of it showed that the following throws were the most difficult to demonstrate correctly, based on the percentage of total errors: *tomoe-nage* (24 errors - 12%), *kata-guruma* (18 errors - 9%),

uki-otoshi (17 errors - 8.5%), *uki-goshi* (17 errors - 8.5%), *sasae-tsurikomi-ashi* (17 errors - 8.5%), *harai-goshi* (16 errors - 8%), and *seoi-nage* (15 errors - 7.5%).

Errors in throws such as seoi-nage and *sasae-tsurikomi-ashi* were made by all analysed pairs of deaf judoka. Also, most pairs made mistakes when demonstrating the following techniques: *harai-goshi*, *sumi-gaeshi*, and *yoko-gake* (18 pairs), *uki-otoshi*, *tomoe-nage*, and *yoko-guruma* (8 pairs).

Subsequent analysis of error types showed that deaf judoka lack sufficient skill in elements such as *tsugi-ashi* (stepping) and *kuzushi* (breaking balance). These elements are foundational to judo. According to a study by the Russian Judo Federation in 2016-2017, out of 149 judo coaches, 73.8% had not learned the fundamental principles and basic techniques of judo properly, with 63% having only a vague idea of *kata* or having attempted it (Pfeiffer, U., & Bauer, G., 2010). In this context, the prevalence of such errors among athletes is not surpris-ing.

Another observation is that *uke* often fails to meet the requirements for defending against *tori*'s attack, which leads to distortions in the technical and tactical execution of subsequent throws.

CONCLUSIONS

The analysis of *kata* performances led to the following conclusions:

1. The most frequently recurring errors across different athlete pairs were identified in the evaluation of the following elements: *uke*'s attack and main grip (lack of a committed attack from *Uke*); *uke*'s defence, assuming the position of *shizentai* (*uke* fails to demonstrate proper defence - the blocking movement). Effectiveness and realism were compromised as a result of the previous errors.

2. Despite the sufficiently detailed breakdown of the evaluated technical elements, the IJF rules do not encompass the full range of requirements for performing the *Nage-No-Kata*, as they primarily address the external aspects of the demonstration (direction of throw, distance, grip position, sequence of steps, etc.).

3. To enhance the effectiveness of athlete preparation for kata competitions and to utilise kata as a method for studying judo techniques, it is necessary to employ the Kodokan *Kata* Textbook [(Kodokan Judo Institute, n.d.)] more extensively. This includes familiarisation with both technical-tactical and semantic aspects of technique execution when planning and preparing *kata* sessions for athletes. For this purpose, the fundamental work by T. Otaki and D. Draeger (1990), dedicated to all aspects of *Nage-no-Kata* performance, from philosophical to morphofunctional, would be invaluable.

4. To achieve high scores in *kata* competitions, coaches who wish to prepare athletes for *kata* must pay special attention to and master the basics of *Kihon* judo, as below. At the initial preparation stage, focus should be placed on developing skills in performing *Kihon* elements that form the foundation of judo, such as: stance (*shisei*), movement (*shin-tai*), body-turning (*tai-sabaki*), gripping (*kumi-kata*), breaking balance (*kuzushi*), and break-falls (*ukemi*).

5. For the flawless execution of techniques requiring stability on one leg (e.g., *harai-goshi, uchi-mata*), it is necessary to improve statokinetic stability and ensure co-ordinated work of the vestibular and muscular systems. Using various training devices is recommended for this purpose; the authors successfully utilised a Domyos sensor-balancing board.

REFERENCES

Aleksey Gorbylev. (2017). Kratkiy ocherk stanovleniya sistemy dzyudou Oshchepkova-sambo. In Khiden. *Boyevyye iskusstva i rukopashnyy boy*. 6, 211–256.

Emelyanov, V. Yu. (2015). Deaf martial arts. History and today. *Adaptive Physical Education, 4*(64), 36–37.

Emelyanov, V. D., Krasnoperova, T. V., Shevtzov, A. V., & Shelkova, L. N. (2014). Osoben-nosti fizicheskogo razvitiya i obespecheniya lokomotornykh funktsiy dvigatel'noy deyatel'nosti lic s sensornymi narusheniyami s uchetom vozrastnykh i gendernykh razlichiy. Adaptivnaya fizicheskaya kul'tura, 1(57), 2–5.

Emelyanov, V. Yu., & Chainikov, A. P. (2017). Analiz tekhniko-takticheskoy podgotovlennosti uchastnikov chempionata Rossii po dzyudo sredi invalidov po slukhu. Adaptivnaya fizi-cheskaya kul'tura, 3(71), 13–14.

Emelyanov, V. Yu. (2016). Issledovaniye koordinatsionnykh sposobnostey u dzyu-doistov s narusheniyem slukha. *Adaptivnaya fizicheskaya kul'tura, 2*(66), 42–45.

International Judo Federation. (2019). Documents. Kata Competition Criteria for Evaluation (Version 01.2019). Retrieved from http://99e89a50309ad79ff91d-082b8fd5551e97bc65e327988b444396.r14.cf3.rackcdn.com/up/2016/09/IJF_Kata_competition_rules_201-1473769749.pdf

Irish, T., Cavallerio, F., & McDonald, K. (2017). "Sport saved my life" but "I am tired of being an alien!": Stories from the life of a deaf athlete. *Psychology of Sport and Exercise, 37*, 179–187. doi: 10.1016/j.psychsport.2017.10.007

Jigoro Kano. (2013). Kodokan Judo: *The Essential Guide to Judo by its Founder Jigoro Kano*. Kodansha International.

Jigoro Kano. (2009). Rassuzhdeniya o naznachenii uprazhneniy v kata i randori v dodze. In Khiden. *Boyevyye iskusstva i rukopashnyy boy*, IV, 239.

Kawaishi, M. (1982). *The Complete Seven Katas of Judo*. Overlook Books.

Kulanov, A. E. (2017). Vasiliy Oshchepkov, Series Zhizn' Zamechatel'nykh Lyudey, Issue 1667. Molodaya Gvardiya Publishers.

Kuldin, Ye. L., & Tabakov, S. Ye. (2019). Pedagogicheskiye usloviya realizatsii printsipov klassicheskogo dzyudo v bazovoy podgotovke sportsmenov. Proceedings of the XVI All-Russian with international participation scientific and practical conference dedicated to the memory of honored master of sports of the USSR, honorary trainer of the USSR, professor

Otaki, T., & Draeger, D.F. (1990). *Judo formal techniques*: *A complete guide to Kodokan randori no kata*. Tuttle Publishing, North Clarendon, VT, USA.

Pfeiffer, U., & Bauer, G. (2009). *Judo Nage-no-kata: Throwing Techniques*. Meyer & Meyer Verlag.

Pfeiffer, U., & Bauer, G. (2010). *Judo-Nage No Kata [Kindle Edition]*. Meyer & Meyer Sport (UK) Ltd.

Shestakov, V. B., & Yeregina, S. V. (2011). *Judo Theory and Practice*. Sovetskiy Sport Pub-lishers.

Shestakov, V. B., & Yeregina, S. V. (2015). *Vasiliy Oshchepkov – osnovatel'* Sambo. OLMA Media Group Publishers.

World Health Organization. (2025, February 26). *Deafness and Hearing Loss*. Retrieved from http://www.who.int/mediacentre/factsheets/fs300/en/

[Web Site]. (n.d.). *Kodokan Judo Institute Waza Forms Textbook*. Retrieved from http://kodokanjudoinstitute.org/en/waza/forms/textbook/

Article history
Received: 26 November, 2024
Accepted: 23 July, 2025

From Kata to Chaos:
The Rise of *Randori* in *Kitō-ryū Jūjutsu* and Beyond

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Abstract: *This paper examines the historical development of randori (□□□), "free practice," within Kitō-ryū jūjutsu and its transformation into a central pedagogical method of modern jūdō. Drawing on transmission scrolls (densho), oral traditions, and secondary scholarship, it traces Kitō-ryū's training progression from kata-geiko (fixed forms) through cooperative drills such as nokori-ai, to jiyū-ran (unscripted free practice). These stages cultivated adaptability while maintaining safety, ensuring practitioners could internalise principles of posture, kuzushi (breaking balance), and timing under dynamic conditions. Comparative analysis highlights parallels with sumō kakari-geiko and randori-geiko, showing that graduated resistance was a common pedagogical strategy across Edo-period martial training. Tokugawa regulations, including shogunal decrees and the founding of the Kōbusho academy, further systematised the place of randori within martial curricula. Kanō Jigorō inherited these practices and re-engineered them for safety and education, framing randori as the laboratory of jūdō - a method for testing and refining technique through live, repeatable practice. The legacy of Kitō-ryū "chaos training" extends beyond the Kodokan. Many modern jūjutsu schools employ drills similar to randori to bridge from kata (predetermined "forms") to more realistic applications. Certain aikidō schools, such as Shōdōkan (Tomiki) aikidō, formalise randori in both competitive and non-competitive formats, while others use jiyū-waza ("free techniques") to test responsiveness. In parallel, Brazilian jiu-jitsu (BJJ) popularised "rolling" (simulated combat using techniques learned in a controlled environment (BJJ.PRO, 2025) as its defining practice, built on the same principle of live, unscripted engagement. Together, these modern disciplines confirm the enduring global relevance of randori. By bridging tradition and innovation, form and freedom, randori continues to shape martial arts practice worldwide as a dynamic method for cultivating true skill.*

Keywords: *Randori, Kitō-ryū jūjutsu, Kanō Jigorō, jūdō pedagogy, Tokugawa martial culture, densho*

Randori (乱取り) – often translated as "free practice" – is the capstone of modern *jūdō* sparring training, but its roots originated in Edo-period *jūjutsu* schools. Among these, *Kitō-ryū* (起倒流, "rise-fall school") *jūjutsu* played a pivotal role in developing ran (乱, literally "chaos" or "disorder") practice as a bridge between fixed forms and free engagement. This article traces the origin and evolution of randori through *Kitō-ryū*'s pedagogy, drawing on historical scrolls (*densho*), training methods (*keiko*), and parallels in *sumō*, and shows how these practices influenced Kanō Jigorō in formulating Kodokan *jūdō randori*. (Kanō, 1986).

METHODOLOGY AND FRAMING

This study draws upon a combination of primary and secondary materials, each presenting distinct interpretive challenges. Primary sources such as the *Ten no Maki*, *Chi no Maki*, and *Jin no Maki* of *Kitō-ryū*, along with other Edo-period material are invaluable for understanding the evolution of *ran* training, yet their low accessibility and accuracy present interesting challenges. Peer-reviewed translations of these scrolls are scarce, and where translations are available, they are used as data points rather than definitive authorities. Interpretations are cross-checked against descriptions from other *jūjutsu ryūha* and considered within the wider context of Tokugawa martial culture.

The use of oral teachings and anecdotal accounts is also challenging, since they preserve the spirit of a lineage but cannot be verified in the same way as written scrolls or official regulations. For this reason, such material is included illustratively rather than as firm historical evidence. To offset these limitations, other scrolls from related *jūjutsu ryūha* and a broad base of secondary scholarship are employed to triangulate interpretations and to situate them within the context of Tokugawa society.

For clarity, this study also distinguishes between *koryū bujutsu* (classical martial traditions) and *gendai budō* (modern martial ways). The *koryū* include Edo-period *jūjutsu ryūha* such as *Kitō-ryū* and *Tenjin Shin'yō-ryū*, which transmitted their curricula through *densho* and operated within the cultural structures of Tokugawa society. These systems emphasised kata-based pedagogy, with limited and carefully defined modes of freer practice. By contrast, *gendai* systems emerged from the late nineteenth century onward, adapting inherited practices to educational and sportive contexts. In this framing, *koryū* and *gendai* martial arts are not treated as equivalents but as part of a continuing legacy: both preserve and reinterpret the idea of *ran* training, showing how structured "chaos" has remained central to martial pedagogy across historical periods.

Early References to "Ran" in *Kitō-ryū* Scrolls

Even in the 17th century, *Kitō-ryū jūjutsu* emphasised "ran" practice, as noted by Yagyū Jūbei in his *Tsuki no Shō* (1642), which mentions a "*Kitō-ryū Ran Mokuroku*" (起倒流乱目録) - essentially a catalogue of "chaos" techniques or principles (Wikipedia, 2025c). This suggests that ran, the idea of free or chaotic engagement, was considered pivotal to *Kitō-ryū* from its early days. Indeed, *Kitō-ryū*'s founder Ibaraki Sensai (Mataemon) (n.d. – 1674) is said to have compiled a scroll by that name under the influence of Zen master Takuan Sōhō (1573-1645) (Wikipedia, 2025c). In other words, long before the creation of modern *jūdō*, *Kitō-ryū* formalised the concept of ran in its teachings.

According to research by Professor Yoshiaki Tōdō, one of the precursors of randori was a *Kitō-ryū* training method called "*Kitō-ryū midare*" (起倒流乱れ, with *midare* meaning "disorder"). This method was developed by Ibaraki (active in the Tokugawa Iemitsu era, early 1600s), who highly valued its agile, fluid movements. He grouped the throwing methods under *tai* and *sha* (体・捨), denoting body-based and sacrifice throws, and distinguished them from receiving skills (*uke*, 受). In essence, *Kitō-ryū midare* was an early form of ran practice - introducing controlled chaos into training alongside the strict forms of kata.

***Kitō-ryū*'s Training Progression**

In *Kitō-ryū* (and many classical *jūjutsu* styles), training followed a graduated progression from set forms to free-form practice. While the precise terminology varied historically, modern researchers and practitioners often describe the stages as:

- ***Kata-geiko*** (形稽古) – "form practice." Students first learned fixed kata (a "form" of prearranged sequences of techniques) to ingrain fundamental waza ("techniques") and principles. Kata-geiko was the foundation, ensuring correct techniques and combative principles were passed down in a structured way.

- ***Kyōryoku-ran*** (協力乱) – "cooperative chaos." After mastering forms, practitioners moved to increasingly free practice with cooperation. In this intermediate stage, one partner might play the attacker in a spontaneous yet accommodating manner, while the other executes techniques. For example, an exercise known as *nokori-ai* (残りあい) (Todo, 1994) had *uke* continuously attack *tori* until *tori* managed to throw uke with a technique from the kata. This drill was still cooperative in spirit – *uke*'s attacks, though fast, were intended to create openings for *tori* to apply learned techniques. Such semi-free sparring allowed students to explore "random" applications of *kata* techniques without the encounter devolving into a contest. It helped transition from the scripted rigidity of *kata* to the fluid responsiveness needed in a real fight.

- ***Jiyū-ran*** (自由乱) – "free chaos." At the advanced level comes true *randori*: both partners freely exchanged techniques with minimal or no predetermined structure or sequence. This was full free-style sparring, where either could seize an opening to throw or pin the other. Importantly, *jiyū-ran* in *Kitō-ryū* was not a fight to injure or win at all costs, but a training method to test skill, timing, and balance under live conditions. Contemporary descriptions liken the relationship between these levels to that of grammar and composition – *kata* being the grammar, *randori* the free composition using those fundamentals. In fact, Kanō Jigorō later said "*randori* and *kata* are like essay writing and grammar" (Watson, 2008), highlighting that free practice was meant to apply principles taught and demonstrated in the *kata*.

- ***Shiai*** (試合) – "match" or competition. Although formal *shiai* were less common in early *Kitō-ryū* days than later in *jūdō*, challenge matches did occur. *Kitō-ryū* exponents sometimes tested their skill in matches with other *ryūha*. From at least the 18th century, instructors of different *ryūha* began staging inter-school contests (*taryūjiai*). Rules were negotiated – for example, the instructors of various schools cooperated to establish common rules for inter-school competitions. As an example, once school might not teach *newaza* ground grappling techniques to beginner students so the matches of its students with another school might prohibit the use of *newaza*. Though primitive, this was a clear attempt to host inter-school competitions with at least a modicum of effort to level the playing rules between the schools (Gatling, 2025).

Heaven, Earth, and Man: The *Kitō-ryū* Transmission Scrolls

In the late Edo period (18th–19th century), masters of *Kitō-ryū jūjutsu* (起倒流柔術) compiled its teachings into three transmission scrolls named after the classical East Asian triad of Heaven–Earth–Man (天地人, ten–chi–jin) (Weymouth, 2017). These *densho* (伝書) framed the *ryū*'s pedagogy as a progression: from guiding principles to methods of training, to applied skill. Together they structured the pathway by which *kata* practice evolved into adaptable, free-flowing ability.

The *Ten no Maki* (天之巻, "Scroll of Heaven") set out the conceptual and cosmological foundations of the school. Rather than listing techniques, it established guiding principles such as balance, posture, the structural mechanics of throwing, and the relationship between stillness and motion. It introduced the principle (理, *ri*) that throws succeed not through force but through alignment with natural laws of balance and leverage. In *Kitō-ryū*, *hontai* (本體, "fundamental posture") is presented as the general principle of correct alignment of both mind and body. It is the condition in which balance is preserved without stiffness, stability is maintained without rigidity, and posture allows readiness in all directions. From this basis, Kanō later reformulated the principle into the modern *jūdō* posture known as *shizentai* (自然体, "natu-

ral posture"), which remains the neutral stance of Kodokan practice today.

The *Ten no Maki* also emphasised the principle of *kuzushi* (崩し, breaking balance). It taught that effective technique comes from unbalancing an opponent, not by contesting strength with strength but by applying leverage in harmony with natural posture. In describing posture, positioning, and execution together, the *densho* contained the elements that Kanō Jigorō would later codify as the three-part process of *kuzushi–tsukuri–kake* (崩し–作り–掛け). While *Kitō-ryū* did not present these stages as a formalised three-part model, its explanations of unbalancing, positional preparation, and the act of throwing clearly provided the foundation for Kanō's later systematisation. These descriptions provided the immediate background for his integration of *kuzushi* into the technical and philosophical core of *jūdō*.

The *Chi no Maki* (地之巻, "Scroll of Earth") developed these concepts into a structured method of training. Its sections - which include *Teki ni Jūgō Kyōjaku no Koto* (敵に柔剛強弱之事, "On facing opponents of varying strengths"), *Shiki Ryokusabetsu no Koto* (志氣力差別之事, "On the distinction between spirit and force"), *Muhyōshi no Koto* (無拍子之事, "On acting without rhythm"), and *Chōshi no Koto* (調子之事, "On timing") - guide practitioners from fixed *kata* into adaptability. By emphasising variety of partners, rhythm and timing, and the ability to respond freely, the scroll clearly anticipated the practice of *randori* (乱取り). This adaptability in training presaged the *jūdō* philosophy of mutual benefit (*jita kyōei*, 自他共栄), noting that success in training depends upon cooperation and the shared cultivation of skill rather than domination.

The *Jin no Maki* (人之巻, "Scroll of Man") completes the triad; it catalogues the *ryū*'s *waza* (techniques) in structured form. It is divided into two sections, the first comprising formal techniques and the second containing seven *waza* intended for freer, more flowing execution. As the "Scroll of Man," it symbolises human endeavour - the ability to unite Heaven's principles and Earth's training into embodied skill. Here the practitioner carries the responsibility to synthesise principle and practice, transforming *kata* into adaptable technique. This integration of theory, training, and application set the stage for *jūdō*'s modern balance of form, free practice, and the pursuit of harmony between individual growth and collective well-being.

Together, the three scrolls presented a vision in which Heaven's laws, Earth's practice, and human endeavor come together. In this way, the *Kitō-ryū densho* could be seen to anticipate and be in accordance with the two philosophies of *jūdō*: the principle of *kuzushi* and natural alignment are consistent with maximum efficiency (*seiryoku zen'yō*), and cooperative training and the shared pursuit of skill are in the spirit of mutual benefit (*jita kyōei*).

It is worth noting that *Kitō-ryū* was not alone. *Tenjin Shin'yō-ryū* (天神真楊流), another *jūjutsu* school (which Kanō also studied), likewise incorporated *randori*. Founded around 1830 by Iso Mataemon (1787-1863) from the synthesis of *Yoshin-ryū* (楊心流) and Shinno *Shindō-ryū* (神農神道流), the school placed strong emphasis on *atemi-waza* (striking techniques usually aimed at vital points) alongside joint locks and chokes. Because many of these techniques were too dangerous for free sparring, the school created a reduced curriculum of safer techniques specifically designated as *midare keiko* (乱稽古) (Masters, 2025). This section of the syllabus is approximately eighteen throws, holds, and chokes. These safer techniques allowed students to practise with resistance while minimising risk. Positioned late in the transmission scrolls, just before the esoteric teachings, *midare keiko* functioned as a bridge between *kata* and practical application, providing a controlled method for testing skills under less scripted conditions. This highlights that by the late Edo period, free sparring drills were a recognised part of *jūjutsu* pedagogy in several schools, though each *ryūha* had its own flavour of "ran" practice. Importantly, *Tenjin Shin'yō-ryū* still preserves *midare keiko* today, maintaining it as a technical catalogue that embodies the school's approach to combining *kata*-based study with limited free practice.

Tokugawa-Era Context

During the Tokugawa period (1603–1868), martial training became increasingly formalised and regulated. This was shaped by the *Bakufu* (Japan's military dictatorship government through the Tokugawa shogun) edicts such as the *Buke Shohatto* (Laws for the Military Houses), first issued in 1615, which set standards for *samurai* behaviour, education, and preparedness (Hall, 1970; Vaporis, 1994). While not prescribing martial techniques directly, the *Buke Shohatto* established expectations and demands for maintaining *samurai* readiness while curbing unnecessary violence, creating conditions that favoured regulated instruction within licensed schools.

In addition to universal *shogunal* decrees, certain domains (*han*) enacted their own martial regulations. *Daiymō* (Edo era feudal lords) in places such as Aizu and Satsuma required licensed *ryūha* to instruct retainers in more systematised curricula (Hurst, 1998). These licences often specified *kata* training but also encouraged adaptive drills or controlled free practice (*ran*) to prepare warriors for unpredictable situations. In this way, domanial edicts ensured martial instruction remained both practical and adaptable, even in an era of peace.

By the late Edo period, the *Bakufu* took a further step by founding the *Kōbusho*, a military academy established in Edo in 1856. This institution combined traditional martial arts such as *kenjutsu*, *sōjutsu*, and *jūjutsu* with Western artillery, gunnery, and mathematics. Instructors were drawn from leading *ryūha*, including Suzuki Seibē of *Kitō-ryū*, who taught his school's structured pedagogical approach to the academy (Todo, 1994; SamuraiWiki, 2025). The *Kōbusho* thus represented the most prominent known example of direct national state involvement in martial training during the Tokugawa era by blending classical martial arts and forms with modern military science only recently imported from the West.

Finally, Tokugawa legal principles such as *Kenka Ryōsei-bai* (mutual punishment for unauthorised fighting) curtailed public duelling (Friday, 1997). It discouraged unsanctioned violence and effectively pushed martial schools to internalise sparring and combative testing into controlled training regimes. As a result, free practice methods such as *randori* emerged—driven both by the need for innovative teaching approaches and by legal restrictions that required warriors to refine their skills without violating *bakufu* law.

Tales abound of *samurai* of the Tokugawa era portrayed as wary of martial training degenerating into empty, ineffective forms. Within later accounts, this concern is echoed in *dōjō* traditions that emphasised the need for free fighting alongside *kata*. Hisa Takuma (1895-1980) (*Menkyo Kaiden* in *Daitō Ryū Aikijūjutsu*, *Sumō* 8 Dan – Amateur *Yokozuna* and *Jūdō* 7 Dan) related an oral tradition of a notice that is said to have hung in a *dōjō* in the late Edo period, also known as the *Bakumatsu* ("end of the *bakufu*") period (the exact school remains uncertain), which warned against over-reliance on fixed forms:

"There are many schools teaching only forms. But in this training centre all schools must do fighting matches. The more popular *kata-budō* becomes, the more *samurai* lose their fighting spirit. Hence even *Yagyū-ryū* should come and fight with us." (Amatsu, 2006)

While not an official government decree, the saying reflects a remembered ethos within certain lineages-that *kata-budō*, left unchecked, risked dulling combative vitality, and that even prestigious *ryūha* were expected to test themselves in *randori*.

Hisa Takuma's thoughts on *kata-budō*

The importance of *ran* was not purely technical. As Hisa Takuma, observed and passed on to his students (Amatsu, 2006), he noted, not to cling to forms at the expense of effectiveness, reminding simply:

"Don't stick to forms, it is effectiveness that counts."

Drawing on his background as a former *sumō* wrestler, Hisa understood the realities of actual fighting and felt that *kata-budō* alone could not prepare someone for it. He explained that *kata*-based training has important merits: it is accessible to all ages and genders; it offers enjoyable, low-risk practice and it provides stress relief - the act of throwing someone, even in controlled practice, can be uplifting, especially for older practitioners or those seeking an escape from daily life. However, Hisa was candid about the shortcomings:

it does not work reliably in real fighting and it leaves practitioners uncertain of their true ability.

Parallels in *Sumō* Training: *Kakari-geiko* and *Randori-geiko*

Interestingly, the structured progression from cooperative to free sparring in *jūjutsu* mirrors training methods in *sumō*, Japan's ancient wrestling art. *Sumō keiko* (稽古, practice) has long included drills that balance repetitive instruction with free bouts – analogous to *kata* and *randori*.

Two fundamental *sumō* terms are: *kakari-geiko* (掛かり稽古) and *randori-geiko* (乱取り稽古) (Amatsu, 2006). *Kakari-geiko* is a drill where one wrestler continuously launches attacks while the other defends or yields, then they reset and repeat. It is essentially a one-sided, repetitive practice to ingrain attacking skills and an aggressive spirit. The attacker charges with full force multiple times in succession, while the senior training partner or instructor provides just enough controlled resistance or guidance to test the trainee's technique and increase his physical fitness. This is reminiscent of *kyōryoku-ran* in *Kitō-ryū* – there is spontaneity in timing and intensity, but one side is deliberately co-operating (or at least not counterattacking) so the other can practice effectively. The exercise builds stamina, aggression, and real-time adjustment, much like *jūjutsu*'s cooperative *randori* drills build a bridge from set patterns to free fighting.

By contrast, *randori-geiko* in *sumō* refers to free wrestling practice - essentially practice matches where both *rikishi* (wrestlers) try to compete under normal *sumō* rules. This corresponds to *jiyū-ran* (free *randori*) in *jūjutsu/jūdō*. In *randori-geiko*, there is no script: it's the full application of skills in a live contest environment with live contest rules, but within the *dōjō* for training purposes. Edo-period *sumō* wrestlers and *jūjutsu* exponents alike understood that such unscripted bouts were crucial for testing one's skill and mettle. Both *kakari-geiko* and *randori-geiko* were-and still are-pedagogical strategies to temper a practitioner through graduated pressure: first cooperative repetition, then competitive freedom. This approach ensured that when it came to an actual match or self-defence situation, the fighter was neither stuck in formal patterns nor unfamiliar with resistance.

The structural parallel is clear: *sumō* and *Kitō-ryū jūjutsu* developed similar training frameworks independently. This reflects a common pedagogy in Japanese martial arts: begin with prescribed forms or drills to instil fundamentals and spirit, then progressively introduce variability and resistance. By doing so, the martial artist internalises techniques deeply (through *kata* or drills) and learns to adapt them under pressure (through randori or sparring).

From *Kitō-ryū* to Kodokan *jūdō*: Kanō Jigorō and Modern Randori

Young Kanō Jigorō, the founder of Kodokan *jūdō*, was a product of this very tradition. Kanō learned *Kitō-ryū jūjutsu* under Fukuda Hachinosuke and Iikubo Tsunetoshi in the early 1880s, after first training in *Tenjin Shin'yō-ryū*. From *Kitō-ryū*, Kanō absorbed not only throwing techniques (*nage-waza*)

and principles like *kuzushi* (崩し, breaking balance), but also the school's approach to *ran* training. It can be posited that the *Kitō ryū* concept of "*ran*" - freedom within structured practice - directly inspired Kanō's development of *jūdō randori* as first described by Kanō in 1889 (Lindsay & Kanō, 1889). As one source puts it, "this concept of 'ran' (freedom) that he learned from the *Kitō* school led to his concept of '*randori*' or 'free exercise'." (Rego, 2014) In fact, the very term *randori* was coined in the *Kitō-ryū* years before Kanō's time. Etymologically, *randori* (乱取り) can be translated as "seizing (or grappling) in chaos." *Ran* (乱) means disorder, tumult, or chaos, and *tori* (取り) means to take or grasp. As *Kitō-ryū* framed it, *randori* was the opposite of the orderly *kata* – a way to capture the essence of combat's randomness by "taking hold of chaos". It is apparent that Kanō adopted not just the term but its underlying pedagogy.

To understand how this idea took practical form in Kanō's training, it helps to look at how *kata* and *randori* functioned within the broader *jūjutsu* traditions he inherited. The methods of *jūjutsu* consist of two forms: *kata* (pre-arranged patterns) and *randori* (free practice). Each school of *jūjutsu* emphasised these differently-some focused exclusively on *kata*, while others developed distinct approaches to *randori*. Broadly, there were four kinds:

(1) those specialising in throwing according to fixed rules;

(2) those also centred on throwing, but emphasising strength over technique;

(3) those employing biting, choking, or striking; and

(4) those focusing on restraining the opponent to restrict movement.

Within *kata* practice itself, each lineage showed unique characteristics, with *Tenjin Shin'yō-ryū* and *Kitō-ryū* regarded as the most representative for their spirit and refinement.

Even after Kanō had begun to teach his own *jūjutsu* students, he continued to study *kata* and received *randori* instruction from Iikubo sensei, a vigorous forty-eight-year-old master of *Kitō-ryū*. In practice, although he sometimes threw Iikubo, Kanō was more often thrown himself. Fascinated by Iikubo's mastery, he studied body movement and discovered that success lay in first breaking balance (*kuzushi*) before executing a throw. He trained diligently in observing the opponent's motion, how to break his balance, and then how to apply technique. By pushing or pulling at the right moment, his opponent's stability could always be disrupted-*kuzushi*-forward and backward being the primary directions among the eight directions of unbalancing. When Kanō explained his findings as a principle to Iikubo, the latter replied, "Indeed, that is exactly so. There is nothing more I can teach you on the mats. Let us refrain from further *randori*," and ended it thereafter. (Oimatsu, 1966)

Kanō Jigorō's breakthrough in *randori* thus came during his continued training under *Kitō-ryū* master Iikubo Tsunetoshi in the early Kōdōkan years. "Usually, it had been him that threw me. Now, instead of being thrown, I was throwing him with increasing regularity," Kanō later recalled (Kanō, 1986). This realisation was not simply about physical technique and *kuzushi*, but also included reading an opponent's intent, exploiting openings, developing intuition and applying principles in live practice rather than relying solely on set forms, and repeatable, safe practice. All benefitted from Kanō's development and repeated practice of randori. The experience affirmed Kanō's belief in *randori* as an indispensable method for testing and internalising technique - a bridge between *kata* training and real application - and marked a pivotal moment in his development of *jūdō*.

Upon founding Kōdōkan *Jūdō* in 1882, Kanō placed *randori* at the heart of training, but with crucial adaptations to modernise it. He viewed randori as the laboratory for applying *jūdō*'s principle of *yawara* / jū (柔, yielding flexibility) under live conditions, so he made it as safe and effective as possible. In essence, Kanō engineered randori for safety so that students could practice full force throws regularly without undue risk. Kanō also adopted *tatami* mats, an inheritance from late-Edo *dōjō* to cushion falls. Kanō's Kodokan *jūdō* was distinguished from classical *jūjutsu* by its emphasis on free sparring. Early Kodokan students engaged in *randori* daily, honing their skills in a competitive but friendly format. Kanō's approach to *randori*, however, was not a no-holds-barred brawl. He eliminated dangerous techniques from regular *randori* and placed what dangerous techniques he wanted to preserve – strikes (*atemi-waza*) and certain joint locks – in the combative *Kime no Kata* (Kanō, 1986). He often reminded his students that *randori* was *keiko* (training), not a street fight: "*Randori* was a training method and tool, not strictly a competition," meant for "research and development" of techniques (Kanō, 1932). In practical terms, this meant *jūdōka* should use *randori* to try new throws, learn from mistakes, and refine their timing without the fear of losing. To prevent randori from devolving into stagnant wrestling, Kanō insisted that *nage-waza* (throws) remain primary – if students spent too much time stalling or only fighting on the ground, he would rebalance the practice.

From his establishment of the Kodokan in 1882 through the 1890s, Kanō and his senior students systematically reviewed hundreds of classical *jūjutsu* techniques, assessing their effectiveness and safety for controlled *randori* and in competition. Influenced by reports from the government Taisō Denshujo, the National Gymnastics Centre and the government-related *Nihon Teikoku Taiiku Kyōkai*, Imperial Japan Physical Education Association that were critical of specific potential physical hazards of adopting *jūjutsu* as a standard school physical education topic - they reduced the curriculum to roughly one hundred techniques that could be performed at full speed with a trained *uke* on *tatami*. This deliberate curation allowed for repeated practice at realistic intensity without undue risk of injury. Even today, after more than a century and a half of development, elite *jūdōka* may know dozens of throws but rely heavily on a small core - five or six in competition - drilled tens of thousands of times. A reasonably fit partner can absorb these throws repeatedly, recover, and continue training. This combination of selective

technique, a safe training environment, and endless repetition gave Kodokan *jūdōka* a decisive advantage over other *jūjutsu* schools-particularly once Kanō and his colleagues began shaping competition rules in the 1890s and beyond (Gatling, 2025). Early *jūdō* exponents – some of them cross-trained in *Kitō-ryū* and other schools – triumphed in exhibitions and police tournaments against *jūjutsu* stylists who relied solely on *kata*. Free practice taught them distancing, reaction, and resiliency that set them apart. Kanō himself noted that randori inculcates "safety, physical strength development, and balanced development" when done properly. He famously equated a training hall full of students engrossed in randori to a laboratory of applied physics and strategy.

Even though Kanō did not invent *randori* from scratch – he inherited it from *Kitō-ryū* and *Tenjin Shin'yō-ryū* – his genius was in refining it and promoting it as a key training aspect of a universal educational sport (Kanō, 1932). In *Kitō-ryū*, *randori* was an internal tool to enhance one's *jujutsu*; Kanō transformed *randori* into both a method to train competitive sport competition and a pedagogical system that unified many *jūjutsu* lineages into one "*jūdō*." As Friday (1997) observed, both *Tenjin Shin'yō-ryū* and *Kitō-ryū* teachers used *kata* and freer practice, and it was considered best to be trained in both. Kanō took that lesson to heart in creating Kodokan *Jūdō*, ensuring that *kata* and *randori* worked together closely together. *Jūdō* preserved *kata* sets to demonstrate physical principles for form and tradition, but *randori* became the primary mode of day-to-day training and the basis for *jūdō* sportive competitions (*shiai*).

Legacy of *Kitō-ryū*'s *Randori* Practice

Modern *jūdō*'s *randori* can thus be seen as the direct descendant of *Kitō-ryū*'s "ran" training. The lineage is linguistic (the very term *randori* from *Kitō-ryū*) and conceptual (the use of free yet rule-governed sparring to pressure-test techniques) as well as pedagogical in its structured progression. *Kitō-ryū*'s influence is explicitly honoured in *jūdō*'s *Koshiki-no-kata* (古式の形), a *kata* that Kanō adopted based on *Kitō-ryū Jin no maki* (人之巻) forms to preserve its techniques. The idea that "form" and "freedom" are two sides of the same coin – *kata* providing the structure, *randori* providing the flow – is a gift from the old *jūjutsu* schools to modern martial arts. The pedagogical strategies developed in *koryū jūjutsu*, particularly within *Kitō-ryū* and *Tenjin Shin'yō-ryū*, established a progression from *kata*-based training toward structured free practice (*ran*). This progression was directly inherited and reinterpreted by Kanō Jigorō in the creation of *jūdō*, where *randori* became the central means of cultivating adaptability, safety, and educational value.

Following *jūdō*'s establishment, modern *jūjutsu* systems (*gendai jūjutsu*) also emerged, blending classical principles with practical training methods suited to self-defence, police, and military applications. Many of these schools developed in the twentieth century and retained *randori*-style drills as a bridge between traditional *kata* and live application. Though their emphases vary, most modern *jūjutsu* lineages continue to view *randori* as an essential means of testing skill under resistance while maintaining safety and control.

Later martial systems, such as *Shōdōkan Aikidō*, carried this legacy forward in distinctive ways. Tomiki Kenji, a direct student of both Kanō Jigorō and Ueshiba Morihei, developed a competitive *randori* format within *aikidō* that clearly echoed *jūdō*'s laboratory of live practice. While preserving Ueshiba's *kata*-based technical curriculum, Tomiki introduced structured *randori* drills and competition rules designed to test *aikidō* techniques under pressure without abandoning safety (Shodokan Aikido Federation, 2025). He also trained and was a senior at the *Asahi Shimbun dōjō* during the 1930s, an episode that highlights his unique position at the intersection of *jūdō*, *aikidō*, and the *Daitō-ryū* heritage that underpinned Ueshiba's art. His innovations later evolved into *Shōdōkan aikidō*, the only *aikidō* style to promote *randori* as a formal training method.

Beyond Japan, *jūdō*'s global spread carried this pedagogy abroad. *Brazilian jiu-jitsu* emerged when Mitsuyō Maeda, a Kodokan *judoka*, *jūjutsuka*, and prizefighter, settled in Brazil in 1914 and began teaching Carlos Gracie in Belém around 1917 (Gracie, 2008). Over time, the Gracie family and their students adapted these teachings into a ground-focused system, developing "rolling" as the central method of practice. Although shaped by its own history and technical emphases, BJJ's pedagogy rests on the same principle that true proficiency requires unscripted, resistant training. In each case, the *koryū* model of bridging fixed form with controlled freedom underlies the *gendai* systems, affirming the enduring value of randori as a universal method for transforming martial theory into embodied skill.

In each case - *jūdō*, modern *jujutsu*, *Shōdōkan aikidō*, and *Brazilian jiu-jitsu* - the fundamental pedagogy remains the same as what it was practised in *Kitō-ryū*'s dojo centuries ago: start with cooperative learning, then progressively ramp up resistance and unpredictability. It speaks to the timeless understanding that martial skill cannot be fully realised in theory alone – one must practice in the dynamic, unscripted realm of "chaos" to truly master the art.

REFERENCES

Amatsu, Y. (2006). *The real Daito-ryu Aikijujutsu: What menkyokaiden Hisa Takuma taught me*. Self Published.

BJJ.PRO (2025) O que é o Rola no Jiu-Jitsu? Explicação Completa [*What is Rolling in Jiu-Jitsu? A Complete Explanation*]. Retrieved 23 October 2025 from https://bjj.pro.br/post/o-que-e-o-rola-no-jiu-jitsu. (In Portuguese)

Friday, K. F. (1997). *Legacies of the Sword: The Kashima-Shinryu and Samurai Martial Culture*. University of Hawaii Press.

Gatling, L. (2025). The Kanō Chronicles: *The Untold History of Modern Japan*. Retrieved August 17, 2025, from www.kanochronicles.com

Gracie, R. (2008). *Carlos Gracie: The creator of a fighting dynasty*. São Paulo, Brazil: Editora Global.

Hall, J. W. (1970). *Japan: From Prehistory to Modern Times*. Charles E. Tuttle.

Hurst, G. C. (1998). *Armed Martial Arts of Japan: Swordsmanship and archery*. Yale University Press.

Jūdō Info / Nagaki, K. (1998). *Randori and the Unification of Jujutsu*. Retrieved August 17, 2025, from https://judoinfo.com/randori1/

Kanō, J. (1932). *The Contribution of Jūdō to Education*. Lecture delivered at the University of Southern California. Reprinted in Bulletin of the Association for the Advancement of Physical Education.

Kanō, J. (1986). *Kodokan Jūdō*. Tokyo: Kodansha International.

Lindsay, T. & Kanō, J. (1889). Jiujutsu: The Old Samurai Art of Fighting without Weapons. *Transactions of the Asiatic Society of Japan, 16*, 192–205.

Masters, P. (2025). *Tenjin Shinyo Ryu Jujutsu*. Tenyokai International. Retrieved August 17, 2025, from https://www.tenyokai.com/articles/booklet.pdf

Oimatsu S. (1966). *Jūdō Hyakunen* [One Hundred Years of Judo]. Tokyo: Jiji Tsūshinsha.

Rego, G. (2014). *Randori origins: The development of free practice in jūdō and jujutsu*. Retrieved August 26, 2025, from https://floridajukido.com/randori-in-jukido-jujitsu

SamuraiWiki (2025). *Samurai Archives*. Retrieved August 17, 2025, from https://samurai-archives.com/wiki/Kobusho

Shodokan Aikido Federation. (2025). *There are three levels of randori practice*: Retrieved August 17, 2025, from https://en.shodokanaikido.com/faq

Tōdō, Y. (1994). Jūdō rantori no rekishi ni tsuite-kigen to sono go no hatten [The history of randori in judo: Origins and subsequent development]. *Bulletin of the Association for the Scientific Studies on Judo, Kodokan, 7*, 11–19. (In Japanese).

Vaporis, C. N. (1994). *Breaking barriers: Travel and the state in early modern Japan*. Harvard University Asia Center.

Watson, B. N. (2008). *Jūdō Memoirs of Jigoro Kano*. Trafford Publishing.

Weymouth, L. J. T. (2017). *The translation and transcription of the Kitō Ryū Jūjutsu Yoroi-Gumiuchi no Densho*. Retrieved August 17, 2025, from https://katafreunde-deutschland.de/wp-content/uploads/2024/10/Judo-Kito-Ryu-full-Moku-roku.pdf

Wikipedia. (2025a). *Kōbusho (*講武所*)*. In Wikipedia. Retrieved August 17, 2025, from https://en.wikipedia.org/wiki/K%C5%8Dbusho

Wikipedia. (2025b). *Kitō-ryū*. Retrieved August 17, 2025, from https://en.wikipedia.org/wiki/Kito-ryu

Wikipedia. (2025c). *Kitō-ryū*. (起倒流) Retrieved August 17, 2025, from https://ja.wikipedia.org/wiki/%E8%B5%B7%E5%80%92%E6%B5%81 . (In Japanese)

Yagyū, J. M. (1642). *Tsuki no Shō [Scroll of the Moon]*. Manuscript, Edo period. (In Japanese)

Article history:
Received: 31 August, 2025
Accepted: 10 November, 2025


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