ARCHIVES OF BUDO
Journal of Innovative Agonology

e-ISSN: 1643-8698

Section: ***HEALTH THROUGH COMBAT SPORT & SURVIVAL EXERCISES*** *Original Paper*

Men-strike motion in kendo *eighth-dan* practitioners: a time-series analysis of joint and *shinai* angle commonalities and variability

Naoki Murase[1A-E], **Yuki Suzuki**[2BD] , **Hirotaka Nakashima** [3BD] , **Shinji Sakurai** [1AD]

[1] School of Health and Sports Sciences, Chukyo University, Toyota, Aichi, Japan; 1; e-mail: n-murase@sass.chukyo-u.ac.jp
[2] Kawai Junior High School, Okazaki, Aichi, Japan; e-mail: octopus.jumper@gmail.com
[3] Japan Institute of Sports Sciences, Tokyo, Japan; e-mail: hirotaka.nakashima@jpnsport.go.jp

* **Corresponding author:** Naoki Murase, School of Health and Sports Sciences, Chukyo University; n-murase@sass.chukyo-u.ac.jp; Tel.: +81-90-8078-6482

Authors' Contribution:

A Study Design
B Data Collection
C Statistical Analysis
D Manuscript Preparation
E Funds Collection

Received: date: 11.09.2025
Accepted: date: 22.12.2025
Published: date: 27.12.2025

Abstract:

Background and Study Aim: The highest rank in kendo – *eighth-dan* – represents technical mastery and maturity, yet quantitative descriptions of striking motions at this level are scarce. Men-strike is one of the fundamental techniques in kendo and is the most frequently used effective strike in actual matches. We aimed to descriptive model men-strike motions in *eighth-dan* practitioners based on by analysing time-series patterns of joint and *shinai* angles to identify commonalities and individual differences.

Material and Methods: Ten *eighth-dan* practitioners (1.73 ±0.04 m; 77.8 ±7.1 kg; 50.5 ±4.9 years of practice) performed *men-strike* while wearing 41 reflective markers. Three-dimensional motion was captured at 250 Hz (VICON), projected to the sagittal plane, and time-normalised (0–100%). Variability at each time point was evaluated using Z-scores against the whole-body joint-angle variability.

Results: Mean *men*-strike motion time was 0.759 ±0.073 s. Low variability ($Z < -1$) appeared in the trunk, both elbows, left knee, and right ankle, whereas the right shoulder and left wrist exceeded +1 at specific phases, indicating individualized adjustments. The leader (result: 0.652 seconds) was the oldest of the surveyed kendo masters (68 years) and the longest practitioner (60 years). However, there is a low negative correlation between the motion time result and both years of training experience ($r = -0.265$) and the age of kendo masters ($r = -0.206$).

Conclusions: *Eighth-dan* kendo practitioners share stable technical features in *men*-strike with selective scope for individual adaptation. These data provide benchmarks for instruction and a foundation for future comparative studies across skill levels.

Keywords: centre of mass, long-term training, skill level, tachiai

Dictionary:

Dan – *noun* **1.** One of the numbered black-belt levels of proficiency in martial arts such judo and taekwondo. Also called **dan grade 2.** Somebody who has achieved a dan [15].

Tachiai – a competition or duel between two opponents. The person who oversees about is also referred to as the *tachiai* [16].

Skill – *noun* an ability to do perform an action well, acquired by training [15].

Kote – glove; forearm; site of attack.

Coaching – *noun* the activity or profession of training sports players or athletes [15].

1. Introduction

Kendo's practice is a lifelong pursuit to improve competitive performance and achieve a higher rank. For many kendo practitioners, passing the *eighth-dan* examination is the pinnacle goal. Kendo's ranking system ranges from first (lowest) to *eighth-dan* (highest). Those who attain this level are recognised for their technical mastery and expected to embody a high level of personal maturity and spiritual depth, serving as exemplary figures in the kendo community. Indeed, *eighth-dan* practitioners often play essential roles as instructors and referees, preserving and transmitting kendo's cultural legacy.

To qualify for the *eighth-dan* examination, practitioners must hold the *seventh-dan* rank and have practised for at least 10 additional years [1]. Consequently, many candidates are in their 50s or 60s, reflecting decades of continuous practice and experience, in line with the 'lifelong martial art' philosophy of kendo.

The *eighth-dan* examination consists of two stages of 'tachiai', a demonstration format beyond achieving valid strikes within a limited time. It requires refined and efficient strikes and beautiful postures. The All-Japan Kendo Federation [2] defines the standards for the *eighth-dan* as 'those who have thoroughly mastered the ultimate principles of kendo and have reached maturity and perfection in their skills.' Thus, attaining the *eighth-dan* is not merely a testament to technical skill but also an embodiment of the spiritual and artistic dimensions of kendo.

Recent data indicate that the pass rate for the *eighth-dan* examination is only 1.1% [1], underscoring its reputation as the most challenging test in Japan [3]. Thus, many attempt the examination multiple times.

Despite its significance, there has been limited scientific analysis of the striking movements of *eighth-dan* practitioners and how these movements differ from those of lower-ranked practitioners. Previous research on kendo-striking movements has focused on comparisons between skilled and unskilled practitioners [4] or factors influencing strike speed [5]. However, these studies mainly targeted university students or younger practitioners, leaving a gap in our understanding of high-ranking kendo practitioners, particularly those at the *eighth-dan* level.

Some studies have examined *eighth-dan* practitioners, such as their physical characteristics [6], weight distribution during stance [7], and skill evaluation using triaxle accelerometers [8]. However, few studies have quantitatively analysed the striking movements themselves. Although *eighth-dan* practitioners frequently provide demonstration performances at seminars for aspirants, these movements have not been quantitatively documented. As such, analysing and quantifying the striking movements of *eighth-dan* practitioners can provide novel insights for instruction aimed at those aspiring to the *eighth-dan*.

Men-strike is one of the fundamental techniques in kendo and is the most frequently used effective strike in actual matches. As it requires precise coordination across various parts of the body from the initiation of movement to the moment of impact, and demands a high level of consistency and refinement, it is particularly well suited for motion analysis. Moreover, *Men*-strike is central to technical instruction in many teaching contexts, and its refinement is highly valued in the pursuit of advanced *dan* grades. Therefore, analysing *men*-strike specifically to elucidate its time-series characteristics and movement variability can provide valuable insights for instructing practitioners aiming to achieve the *eighth-dan*. In addition, this study specifically focused on men-strike motion among the striking techniques performed by *eighth-dan* kendo practitioners. As it requires precise coordination across various parts of the body from the initiation of movement to the moment of impact, and demands a high level of consistency and refinement, it is particularly well suited for motion analysis.

Moreover, men-strike is central to technical instruction in many teaching contexts, and its refinement is highly valued in the pursuit of advanced *dan* grades. Therefore, analysing men-strike specifically to elucidate its time-series characteristics and movement variability can provide valuable insights for instructing practitioners aiming to achieve the *eighth-dan*.

We aimed to descriptive model men-strike motions in *eighth-dan* practitioners based on by analysing time-series patterns of joint and *shinai* angles to identify commonalities and individual differences.

2. Materials and Methods

Participants

Ten kendo practitioners (mean height: 1.73 ± 0.04 m, mean weight: 77.8 ± 7.1 kg, mean kendo experience: 50.5 ±4.9 years; with the *eighth-dan* rank were included in this study (Table 1).

Table 1. Characteristics of 10 kendo masters examined, holders of *eighth-dan* – ordinal variable: years of practice (in the case of matching age results, then shorter motion time).

Subject code	Age (years)	Height (m)	Weight (kg)	Years of practice	Men-strike motion time (s)
A	68	1.82	89.6	60	0.652
B	66	1.72	69.1	53	0.684
C	65	1.69	76.5	54	0.780
D	64	1.67	83.4	54	0.760
E	64	1.73	86.2	53	0.936
F	58	1.83	85.4	48	0.716
G	58	1.74	69.5	48	0.740
H	57	1.70	69.4	48	0.744
I	56	1.75	75.4	45	0.776
J	52	1.72	75.2	42	0.804
mean & SD					
	60.8 ±4.9	**1.73 ±0.04**	**77.8 ±7.1**	**50.5 ±4.9**	**0.759 ±0.073**

Ethics Committee of the Graduate School of Sport Sciences, Chukyo University (Approval No. 2020-001). All participants were fully informed of the study's purpose and methods, including the potential risks. Written informed consent was obtained from all the participants. This study was approved by the Ethics Committee of the Graduate School of Sport Sciences, Chukyo University (Approval No. 2020-001).

Experimental trials

Before data collection, the participants performed sufficient warm-up exercises and practiced swinging the *shinai* (bamboo sword) and actual strikes to ensure familiarity with the experimental task.

Only trials involving the men (head)-strikes were included in this study. men-strikes, fundamental techniques in kendo widely used in practice and competition, require a wide range of motion and coordinated movements of the entire body, making them particularly suitable for motion analysis. The experimental procedure was conducted as previously described [5]. Each participant was fitted with 41 reflective markers attached to the anatomical landmark and asked to perform strikes towards LED-lit target objects (*men* or *kote*) from a distance of 2.30 m. The participants were also required to strike the illuminated target as quickly and forcefully as possible.

Coordinate system

A right-handed static coordinate system was defined with the Y-axis in the forward direction, the X-axis in the lateral direction, and the Z-axis vertically upwards (Figure 1).

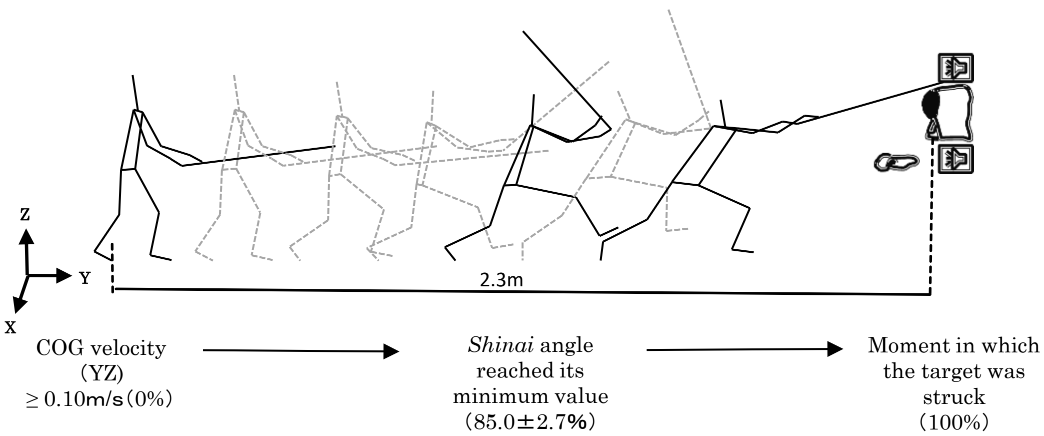


Figure 1. Experiment setup, definitions of global coordinates system and range of analysis.

Data acquisition

Strikes were recorded using a VICON MX motion capture system (Oxford Metrics Group) with 10 cameras (MX13) operating at a sampling frequency of 250 Hz. The instant of the strike was defined as the frame just before the *shinai's* angular velocity became negative. The three-dimensional (3D) coordinate data were smoothed using a Butterworth low-pass digital filter (cutoff frequency: 14.8–18.6 Hz, as optimum cut-off frequency obtained from Yu's et al. [9] recommendation.

Due to the rapid deceleration of the *shinai* at the moment of impact, smoothing was not applied to the coordinate data of the *shinai* tip and *tsubamoto* (base of the *shinai*). All coordinate data and ground reaction forces were projected onto the sagittal plane (YZ plane) for two-dimensional analysis.

Computed indicators

(1) Centre of mass (COM) position and velocity:

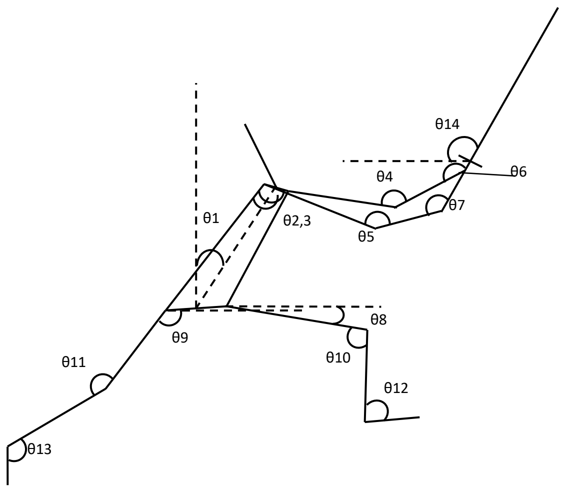
The body was modelled as 14 rigid segments (head, trunk, bilateral upper arms, forearms, hands, thighs, shanks, and feet). The COM position was calculated [10] and its velocity was computed as the numerical derivative of the displacement over time.

(2) *Men*-strike motion time

Men-strike motion time was defined as the time from when the COM velocity (combined Y and Z components) exceeded 0.10 m/s (movement onset) until the moment of impact.

(3) Joint and *shinai* angles and angular velocities

Joint and *shinai* angles were calculated as previously described by Murase et al. [5] (Figure 2). The angular velocities at *shinai* were computed by numerically differentiating the angular displacement over time.



θ1:Upper body angle θ2, 3: Shoulder angle θ4, 5: Elbow angle
θ6, 7: Wrist angle θ8, 9: Hip angle
θ10, 11: Knee angle θ12, 13: Ankle angle θ14: *Shinai* angle

Figure 2. Definition of the joint and *shinai* angles.

Data normalisation and variability analysis

The time from movement onset to strike was normalised to 100% for each participant, and the joint angle data were averaged at 1% increments across all participants. Variability in joint motion was assessed by calculating the standard deviation of the joint angles at each time point.

To evaluate the extent to which each joint's variability deviated from the overall average variability across all joints, the Z-score was calculated as follows:

$$Z = (X - \mu) / \sigma$$

Where: **X** is the standard deviation of each joint at a given time point; **μ** is the mean of the standard deviations across all joints, and **σ** is the standard deviation of those standard deviations.

Thresholds of ±1 were used to indicate 'slightly higher/lower variability', and ±2 to indicate "markedly higher/lower variability'.

This approach allowed for identifying time points with relatively low or high movement consistency for each joint compared with the overall movement variability.

Using the above-mentioned method, variability during movement was compared with reference values based on whole-body joint data to identify characteristic patterns of variability for each joint. In this study, Z-score reference values for variability were not calculated for *shinai* angle. This decision was made because the *shinai*, unlike body joints, is an external instrument involved in the motion and is not suitable for direct comparison with joint movements. In particular, the movement of the *shinai* is largely dependent on wrist and elbow motions, and its range of motion tends to be greater than that of bodily joints, making it inappropriate to evaluate variability using the same reference axis.

3. Results

The average *men*-strike motion time (from movement onset to impact) for all practitioners was 0.759 ± 0.073 s (Table 1).

Shinai angle

The time-series data of the mean *shinai* angle and standard deviation from motion onset (0%) to strike moment (100%) see Figure 3. From around 50%, the angle changed toward the upward direction of the swing (the angle value decreased), and then, toward the moment of impact (100%), the angle changed toward the downward direction of the swing (the angle increased). The standard deviation showed an increasing trend from around 50% to around 100% (Figure 3).

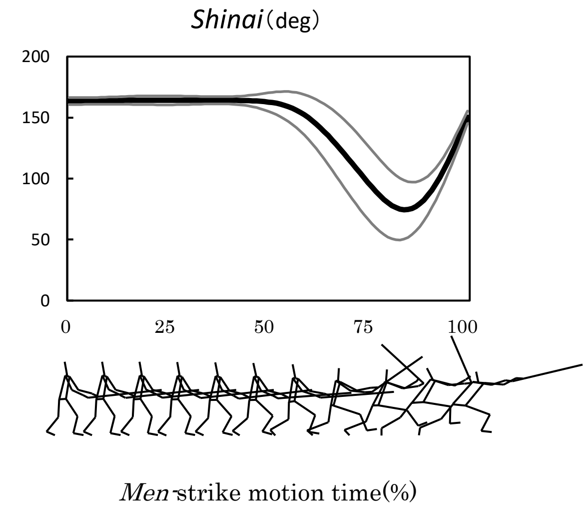


Figure 3. Time normalized and averaged patterns of *shinai* angle in the 2-D plane during *men* strike motion.

In addition, Figures 4–6 present the time-series data of the mean joint angles of various body parts, standard deviations, and reference values (Z-scores) normalised to the percentage of motion time.

Upper body angle

The upper body angle showed a change toward forward leaning (increase in angle value) from around 50% to 100% (impact). The Z-score value remained below the reference value of -1 from 0% to around 90%, and then fell below the reference value of -2 at 100% (Figure 4).

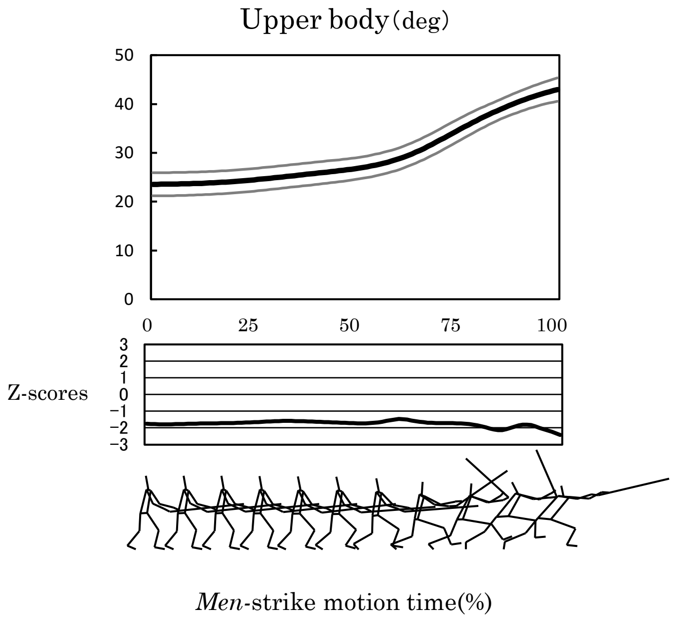


Figure 4. Time normalized and averaged patterns of upper body angle in the 2-D plane during *men* strike motion, along with corresponding Z-scores of variability.

Shoulder, elbow, and wrist angles

Regarding the left and right shoulder joints, the angle began to change (increase) in the flexion direction from around 50%, reaching a peak value around 100%. Regarding the Z-score, the right shoulder joint increased from around 50%, exceeded the reference value of 2 around 70%, and remained above the reference value of 1 until around 80%. On the other hand, the Z-score for the left shoulder joint remained at a value similar to the reference value −1 from 0% to 50%, then increased, and remained at a value similar to the reference value 1 from around 60% to around 80%. Regarding the right elbow joint, the angle changed in the flexion direction (angle decreased) from around 50% to around 75%, and then changed in the extension direction (angle increased) from around 75% to around 100%. The Z-score remained above the reference value 1 from 0% to around 15%, but then remained close to 0 until 100%. On the other hand, the left elbow joint showed little change from 0% to 100%, with almost no flexion or extension movements observed, unlike the right elbow joint. The Z-score also remained between 0 and −1 from around 0% to around 85%, briefly falling below the reference value of −1 around 95%, but then returned to above the reference value of −1 by 100%. The angle changes in the wrist joints were similar between the left and right sides, showing a tendency to change toward flexion (smaller angles) from around 60% to around 80%, and then toward extension (larger angles) toward 100%. Regarding the Z-score, the right wrist joint remained at values nearly identical to the reference value of −1 from 0% to around 65%, then showed an increasing trend but did not exceed the reference value of 1. On the other hand, the Z-score of the left wrist joint remained at values nearly identical to the reference value of 2 from 0% to around 25%, then showed a decreasing trend and remained at values between −1 and 1 (Figure 5).

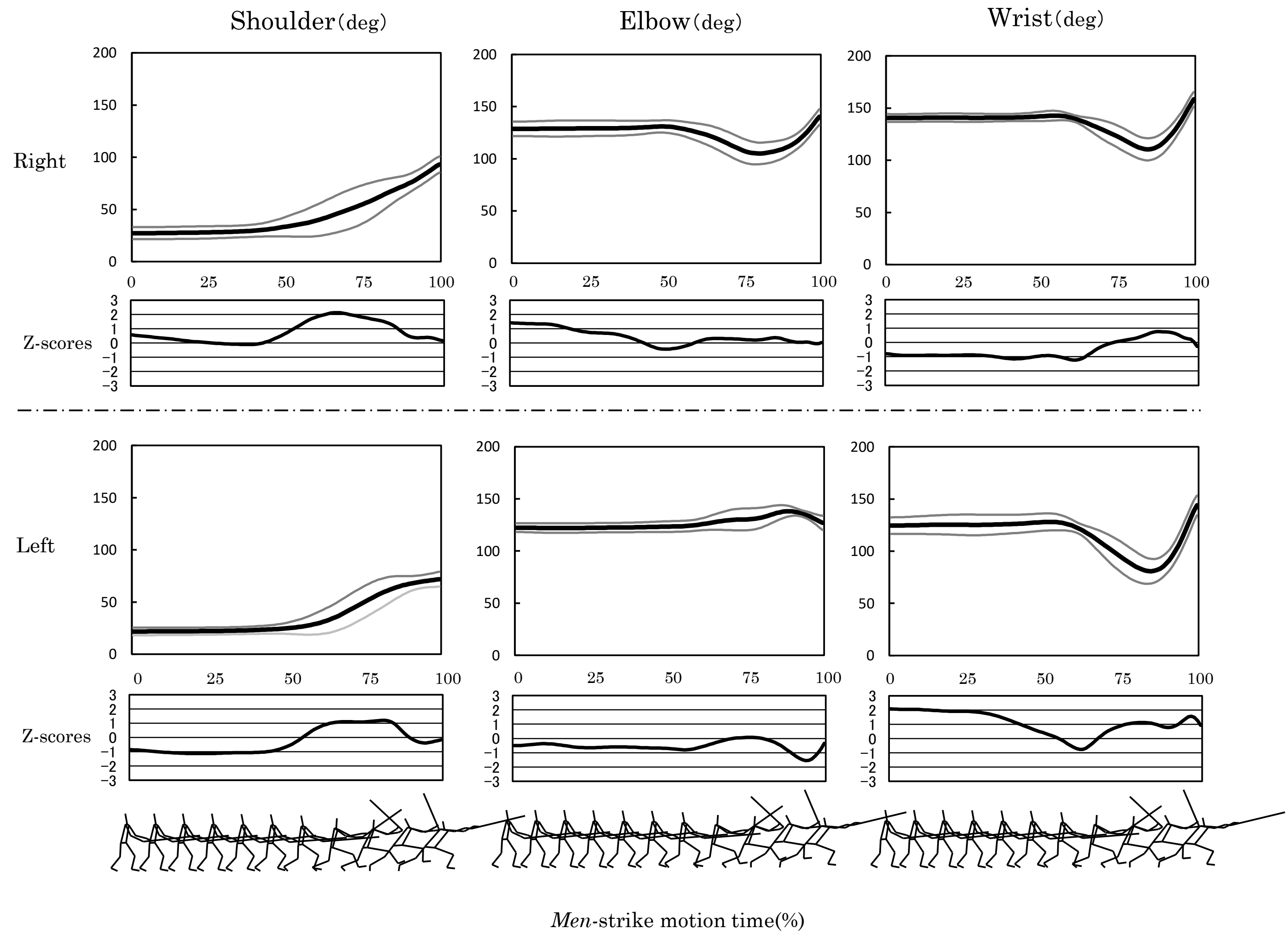


Figure 5. Time normalized and averaged patterns of shoulder, elbow and wrist joint angles in the 2-D plane during *men* strike motion, along with corresponding Z-scores of variability.

Hip, knee, and ankle angles

The right hip joint showed a tendency for the angle to change in the flexion direction (decreasing angle) from approximately 50% to approximately 90%, followed by a slight change in the extension direction (increasing angle) toward 100%. Regarding the Z-score, values exceeded the reference value of 1 from approximately 25% to approximately 65%, but remained below the reference value at other time points. On the other hand, the left hip joint showed little overall change, with a slight tendency toward extension (increase in angle) from approximately 60%. The Z-score remained at values similar to the reference value of −1 throughout. Regarding the right knee joint, there was a gradual tendency toward flexion (decreasing angle) from 0% to 100%. The Z-score remained close to 0 from 0% to around 30%, increased around 50%, and showed a trend similar to reference value 2, continuing to remain nearly identical to reference value 1 until 100%. Regarding the left knee joint, the angle changed in the flexion direction (angle decreased) from around 30%, but then showed a tendency to change in the extension direction (angle increased) until around 90%. The Z-score remained below the reference value 1 throughout, and only slightly exceeded the reference value 1 around 100%. Regarding the right ankle joint, there was a tendency for small changes in angle throughout the study. The Z-score remained at values similar to the reference value 1 from approximately 20% to 25%, then decreased while remaining at values similar to the reference value −1 from approximately 70% to 80%, and remained at values slightly above the reference value 1 at approximately 100%. On the other hand, the left ankle showed a tendency toward a sudden change in angle toward plantar flexion (increase in angle) around 75%. The Z-score remained slightly above the reference value of 1 from around 35% to around 40%, then showed a decreasing trend, but suddenly increased around 75%, with some points reaching the reference value of 2 (Figure 6).

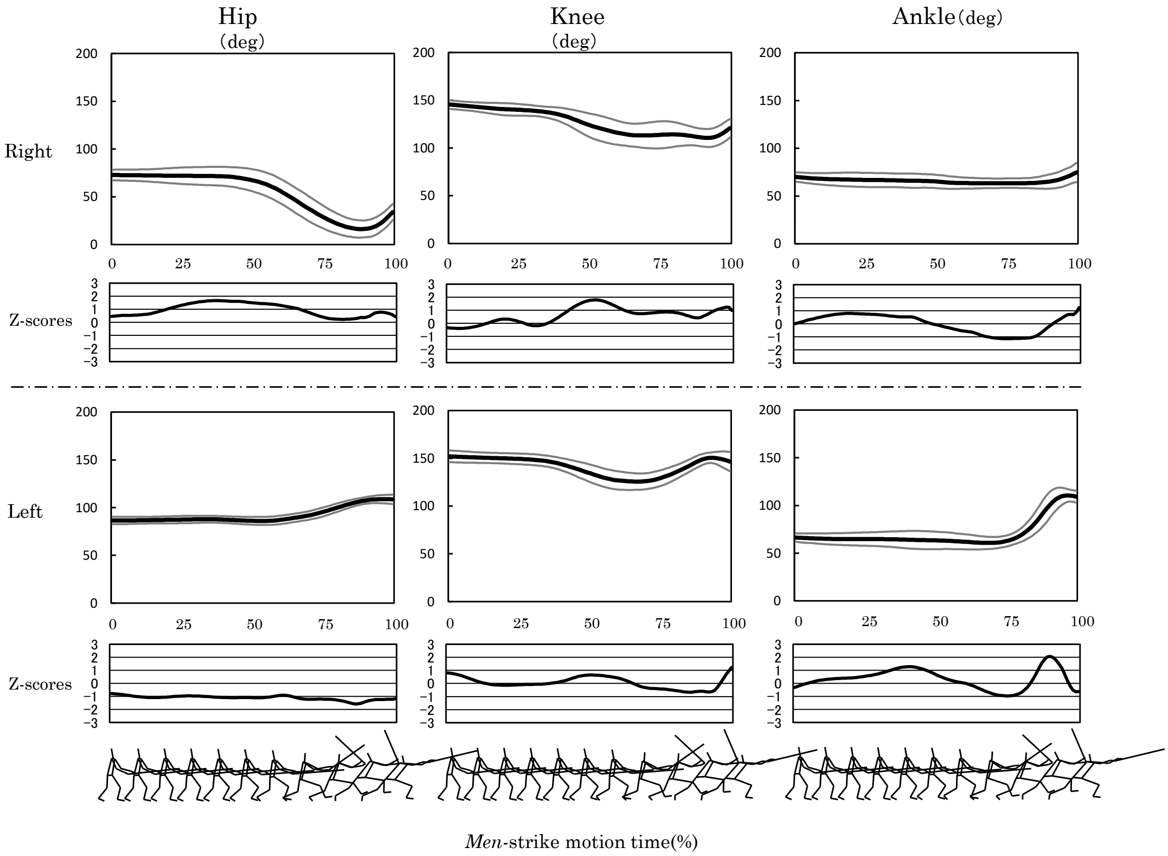


Figure 6. Time normalized and averaged patterns of hip, knee and ankle joint angles in the 2-D plane during *men* strike motion, along with corresponding Z-scores of variability.

The leader, subject 'A', of motion time (result: 0.652 seconds) was the oldest of the surveyed kendo masters (68 years) and the longest practitioner (60 years). However, there is a low negative correlation between the motion time result and both years of training experience (r = −0.265) and the age of kendo masters (r = −0.206).

4. Discussion

The results identified common movement patterns and individual differences in specific body parts. *Men*-strike motion time for the *eighth-dan* practitioners was 0.759 ± 0.073 s, consistent with that previously reported by Murase et al. [11] for university-level kendo practitioners (0.781 ±0.081 seconds). Physical abilities, including reaction time, generally decrease with age [12]. However, in this study, the *eighth-dan* practitioners, some of whom were over 60 years old, demonstrated *men*-strike times similar to those of the younger practitioners. Previous research [13] has suggested that continuous training can mitigate the decline in physical function associated with ageing. Our findings imply that long-term training and accumulated experience of *eighth-dan* practitioners aid in maintaining striking performance at a high level, even with advancing age.

Changes in joint angles of various body parts

The time-series data revealed that certain joints, such as the trunk angle, bilateral elbow angles, right wrist angle, left hip angle, left knee angle, and right ankle angle, maintained Z-scores below −1 throughout much of the motion. These areas of low variability suggest that *eighth-dan* practitioners share highly consistent movement patterns, reflecting years of disciplined practice in pursuit of the 'deal form'. In particular, the forward inclination of the trunk—approximately 40° at the moment of impact—may be essential for achieving an effective and controlled strike.

Shinai manipulation through coordinated flexion and extension of the right elbow and both wrists while minimising changes in the left elbow is critical for refined *men*-strike execution. Additionally, the left leg (supporting leg) showed extension movements at the hip with a relatively small knee flexion, consistent with the established form of an effective kendo strike. *Shinai* manipulation through coordinated flexion and extension of the right elbow and both wrists while minimizing changes in the left elbow is critical for refined men-strike execution. Additionally, the left leg (supporting leg) showed extension movements at the hip with a relatively small knee flexion, consistent with the established form of an effective kendo strike.

Conversely, the right shoulder, left wrist, right hip, right knee, and left ankle exhibited temporary Z-scores above +1 or +2, indicating areas of greater individual variability. Ae and Kobayashi [14] suggested that such variability can reflect skill differences or that these areas are not essential for task performance. In the context of *eighth-dan* practitioners, these joints likely allow for subtle personal adjustments, enabling each practitioner to optimise striking motions based on their physical characteristics and preferences. This balance between common movement patterns and individualised adaptations is particularly important in kendo, where technical mastery coexists with personal expression.

Although this study did not include lower-ranked practitioners as a comparison group, it provided valuable descriptive data on the movement characteristics of *eighth-dan* practitioners. Indeed, this study can facilitate future comparative studies aimed at clarifying the distinction between highest-ranking practitioners and those at lower ranks, offering evidence-based insights into the common elements of the *eighth-dan* technique while highlighting areas where individual variation should be respected. This descriptive approach will aid in establishing a baseline dataset to facilitate future comparative research and support technical instructions for practitioners. Furthermore, analysing individual differences in movements is important not only for identifying personal habits but also for understanding both the 'stable movements common to *eighth-dan* competitors' and the 'diversity of adjustments based on each competitor's skill level'. This is considered to provide insights that can help achieve a balance between 'understanding model common movements' and 'individualized instruction' in coaching.

Study limitations

Men-strike motion from a stationary position, which does not capture the full range of combat scenarios, including responsive or counter-attack strikes. Future studies should extend the analysis to the *tachiai* (demonstration) context to validate our findings. Moreover, comparing *eighth-dan* practitioners with those of lower ranks and across a wider range of ages will provide a more comprehensive understanding of the features distinguishing expert kendo motions.

5. Conclusions

The results revealed consistent movement patterns across practitioners, particularly in trunk inclination and coordinated upper and lower limb movements, as well as in areas with individual variability, such as the right shoulder and left wrist joints. These findings suggest that while *eighth-dan* practitioners share a fundamental "form" in their *men*-strike motion, there remains a degree of personal adaptation in certain joints. Our data provide a valuable benchmark for instructors and practitioners, supporting the teaching of fundamental techniques and respecting individual adaptations and adjustments. Future studies comparing these findings with those of lower-ranked practitioners and analysing *tachiai* scenarios will provide deeper insights into the characteristics and significance of *eighth-dan* kendo movements. This study conducted a descriptive analysis of men-strike motion in *eighth-dan* kendo practitioners by examining time-series data of the joint and *shinai* angles.

Data Availability Statement: The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of the Graduate School of Sport Sciences, Chukyo University (Approval No. 2020-001).

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. All Japan Kendo Federation. Annual results of the kendo *eighth-dan* examination (as of June 2025). Available from: https://www.kendo.or.jp/examination/kendo-8dan/ (accessed 2025 Jun 2).Author 1 A.; Author 2, B. Book Title, 3rd ed.; Publisher: Publisher Location, Country, 2008; pp. 154-196
2. All Japan Kendo Federation. Regulations and detailed rules for iaido and jodo titles, *dan* and *kyu* examinations. Tokyo: All Japan Kendo Federation; 2012. p.11 (in Japanese). Grant M. Gladiators. London: Weidenfeld and Nicolson; 1967
3. NHK. Document Nippon. 1997 (TV program). Japanese
4. Miyake S, Kaga M. Motion analysis of men-strike in elite kendo athletes: Comparison with university kendo players. Res J Budo 2003; 36: 51-8. Japanese
5. Murase N, Horiuchi G, Sumi K et al. Biomechanical factors to shorten the movement time of *men* striking motion in kendo. Int J Sport Health Sci 2017; 15: 36-45
6. Ono M, Niwa N, Yanagimoto A. Physical characteristics of elderly and high-rank kendo practitioners. Jnp J Phys Fit Sport Med 1971; 20(2): 89-95. Japanese
7. Nakiri F, Fujita N, Komorizono M et al. A study on weight distribution in *Chudan-no-kamae* in kendo. Res J Budo 1991; 23: 69-76. Japanese
8. Tatsumi N, Iwase M, Watanabe Y et al. Evaluation of kendo technique skills using a three-axis accelerometer. Seijo Econ Rev 2012; 195: 33-46; Japanese
9. Yu B, Gabriel D, Noble L et al. Estimate of the optimum cutoff frequency for the butterworth low-pass digital filter. J Appl Biomech 1999; 15: 318-29
10. Ae M. Body segment coefficients of Japanese children and athletes. Jnp J Sports Sci 1996; 15: 155-62. Japanese

11. Murase N, Horiuchi H, Sakurai S. Kinetic characteristics of the take-off leg and its relationship with take-off time during men-strike motion in kendo. Jnp J Biomech 2020; 23: 169-78. Japanese
12. Inui K. Simple reaction times and timing of serial reactions of middle-aged and old men. Percept Mot Skills 1997; 84: 219-25
13. Misada F. The importance of exercise in the elderly. Bul KKWC 2011; 49: 29-33. Japanese
14. Ae M, Kobayashi I. Considering commonality and individuality in movement through motion analysis. Jnp J Biomech Sport Exerc 2011; 15: 88-95. Japanese
15. Dictionary of Sport and Exercise Science. Over 5,000 Terms Clearly Defined. London: A & B Black, 2006
16. Budō: The Martial Ways of Japan. Tokyo: Nippon Budokan Foundation; 2009

Authors:

Naoki Murase: https://orcid.org/0009-0003-3726-5416

Yuki Suzuki: https://orcid.org/0009-0002-1584-8912

Hirotaka Nakashima: https://orcid.org/0000-0003-3631-6720

Shinji Sakurai: https://orcid.org/0009-0001-7823-6510

Citation: Murase N, Suzuki Y, Nakashima H et al. Men-strike motion in kendo eighth-dan practitioners: a time-series analysis of joint and shinai angle commonalities and variability. Arch Budo J Inn Agon 2025, 21: 285-296