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# Temporary Judo Combat Structure of Women with Visual Impairment

## Running head: Time-motion in blind female judokas

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## **Temporary Judo Combat Structure of Women with Visual Impairment**

The study of the temporary judo combat structure presents various problems. The judokas (B1-B2-B3) do not compete with equal fighting conditions. The objectives of the study are to determine the temporary structure of judo combat in women with visual impairment, test if the changes in rules have modified the temporality of combat, and establish if there are differences between the visual categories. Of the judokas with visual impairment that competed in the 2018 IBSA Judo World Championship (94 women), all of them participated. By means of observational methodology, we analyzed all of the combats (n=133). In order to obtain the results, we used different analysis techniques: descriptive, one-way ANOVA, t-test to show independents, effect size and detection of t-patterns. The level of significance established for the study was  $p \leq 0.05$ . The results determined a temporary structure for each weight category. With these, the judo professionals will be able to develop precise and suitable trainings for these athletes. We conclude that the combat temporality has changed. There are differences among visual categories, the B1 judokas win only a few combats and their combats are shorter. We consider it necessary to equalize the competition conditions.

Key words: judo; time-motion; Disabled Persons; Visual Impairment; woman

## **1. Introduction**

In judo, effort is intermittent because the actions of the athletes are interjected with pauses. Because of this, it is important to study the temporary structure of combat, since it determines the effort to be made and determines the training load. For this reason, there are numerous studies regarding this matter (Castarlenas & Planas, 1997; Challis & Maturana-Dos-Santos, 2018; Franchini, Artioli, & Brito, 2013; B Miarka et al., 2014). The first problem detected was that these investigations mainly focus on the analysis of the judokas without visual impairment, with very few contributions made to the judokas with visual impairment (VI) (Gutiérrez-Santiago, Prieto, Camerino, & Anguera, 2011; Kons, Krabben, Mann, Fischer, & Detanico, 2019). The necessity of studying this population resides in the fact that these athletes spend more time returning to the starting position when the fight stops, thus the pausing period is longer and the temporary combat structure also results in being altered, indicating that the training load also has to be different (Gutierrez-Santiago, Prieto, Camerino, & Anguera, 2011).

From a sociological and historical standpoint, combat sports that are practiced by men and women have been differentiated (Bianca Miarka, Marques, & Franchini, 2011). Many investigations have shown that technical-tactical differences exist between men and women (B Miarka et al., 2012; Sterkowicz-Przybycien et al., 2017), and because of this, there are studies concentrated exclusively on the women's competition (B Miarka et al., 2014; Bianca Miarka et al., 2016). The review of the subject under study in judo reveals that male combat has been investigated three times more than female combat, being barely addressed in the judokas with VI (Gutierrez-Santiago et al., 2011). So, the second problem that was detected is that the study of female judo has hardly been considered.

The regulation of judo competition has undergone numerous modifications in the last two decades (Samuel, Basevitch, Wildikan, Prosoli, & McDonald, 2019), being that some of the changes have been very relevant, affecting both the internal logic of combat and its temporary structure. These changes have achieved reducing the pause times (Miyake, Matsui, Sato, Yokoyama, & Takezawa, 2014), being the most dynamic combats (Calmet, Pierantozzi, Sterkowicz, Takito, & Franchini, 2017), giving priority to the attacks and using the *ippon* (Bianca Miarka, Brito, et al., 2018), which are aspects that have interfered with the temporal structure, reducing the time of the combat. The study of the effect of these changes has been carried out in the judokas without VI (Calmet et al., 2017), altering the temporary structure of combat (Challis & Maturana-Dos-Santos, 2018), increasing fight sequences and lowering the number and duration of pauses (Hernández-García & Torres-Luque, 2009). It has not yet been carried out in the VI field, this being the third problem that was detected.

The International Blind Sports Federation (IBSA) classifies the athletes according to their VI (B1, B2 and B3). The B1 athletes cannot see anything, those that are B2 have a small amount of vision remaining, and those that are B3 have more vision. The competitions are organized based on this classification, where each athlete competes with those from their same visual category (for example, swimming) or the competition conditions are equalized by blindfolding all of the competitors (for example, the goalball). However, in the case of judo, all compete among themselves independent from their level of VI, and without any type of blindfold. Probably, it is like this because in judo, in addition to obtaining information about sight, haptic and kinesthetic information about gripping can be obtained, making it possible to understand this sport in a way that is quite adequate even without sight (Carmeni, 1998), and because the judokas begin combat by gripping each other (Krabben, Kamp, & Mann, 2018). Despite this, there are quite a few authors who consider that the B1 judokas compete in inferior conditions (Kons et al., 2019; Krabben et al., 2018; Krabben, Ravensbergen,

Nakamoto, & Mann, 2019; Mashkovskiy, Magomedova, & Achkasov, 2019). Because of this, the fourth problem detected is that we should consider that the B1, B2 and B3 judokas do not compete in equal conditions, so we believe that there are differences in the temporary structure among the B1 judokas (visually impaired) and the B2/B3 judokas (who are not completely visually impaired).

In order to resolve this problem, we proposed a study where the objectives were to determine the temporary structure of judo combat in women with VI, to see the changes in regulations have modified the said temporality 20 years later and to establish if there are differences between the B1 and the B2/B3 judokas. The results of this investigation allow the trainers and the sports technicians to establish the most appropriate training loads for their athletes, and that they help the governing institutions of judo for athletes with VI to make pertinent decisions.

## **2. Method**

### ***2.1. Design***

Observational study was used to detect the pattern in the temporary structure in judo combats in women with VI that participated in the 2018 IBSA Judo World Championship. We used observational methodology for this (M. T. Anguera, Blanco-Villaseñor, Losada, & Portell, 2018).

The observational design (María Teresa Anguera, Blanco-Villaseñor, Hernández-Mendo, & Losada-López, 2011) used was nomothetic (all combats), follow-up (the behaviors present in the judo match are analyzed throughout the championship), and multidimensional (there is a concurrence of behaviors). A series of decisions about the participants, the observational instruments and record, and the analytical process is derived from this design.

## **2.2. Participants**

The participants were all of the judokas with VI that competed in the IBSA Judo World Championship that was celebrated in Odivelas-Lisbon (Portugal) in 2018 (n=94 women in the senior category). The study followed the ethical principles of the Declaration of Helsinki. Permission for carrying out the investigation was obtained by the IBSA. The study was approved by the Ethics Committee of the Faculty of Education and Sport Science (University of Vigo, Application 01/1019).

## **2.3. Instruments**

The observational instrument that was used for this study is based on the *Observed Temporal System for Judo Combat -OTSJUDO-* (Gutierrez-Santiago et al., 2011). Its complete description appears in Table 1. The validity of the construction of the observational instrument was affected through its coherence with the theoretical framework (based on OTSJUDO and by consulting two experts in observational methodology and judo who showed their degree of agreement with the instrument, reaching a level of agreement of 97%.

The data was recorded with LINCE v.1.4 software (Gabin, Camerino, Anguera, & Castañer, 2012).

\*\*\*Table 1 near here\*\*\*

## **2.4. Procedure**

The videos that were analyzed in this study were recorded directly in the location where the competition was held by using three Sony model HDR-PJ410 cameras. Following the indications of other investigations (Bianca Miarka, Dal Bello, et al., 2018), each camera was used to record videos in a single combat area, in order to guarantee ecological validity.

After an adequate training about the use of the instruments, two expert evaluators observed and recorded the data of the combats with the Lince program. In order to guarantee the thoroughness of the recording process (Blanco-Villaseñor & Anguera, 2000), the quality of the recorded data was controlled by the concordance calculations of intra and interobservers using Cohen's kappa coefficient (Cohen, 1968) calculated through LINCE software. In both cases (intra and interobserver agreement) the calculation of the kappa coefficient applied to all of the categorical variables of the instrument of observation. Both concordances were carried out in combats that did not belong to the final sample, in a number equivalent to one third of the final sample (n=45). The compliant intraobserver was calculated first, obtaining an average kappa value of all the categories with 0.97 in observer 1 and with 0.95 in observer 2. Later, the compliant interobserver was calculated, obtaining an average kappa value in all of the categories of 0.90.

After recording all of the combats, we obtained an Excel file with the sequentiality of all of the codes of the recorded behaviors, with their temporality and duration expressed in frames. The versatility of this file allowed us to perform successive transformations for the different analyses (Gutierrez-Santiago et al., 2011).

## **2.5. Data Analysis**

All of the analysis statistics were calculated by using IBM- Statistical Package for the Social Sciences, version 20.0 (IBM-SPSS Inc., Chicago, IL, USA). A general descriptive analysis was carried out, others stratified by weight categories, and others depending on the minutes of combat (Challis & Maturana-Dos-Santos, 2018; Franchini, Ferreira, Caio Moura, Ari, Humberstone, & Julio, 2019) of each of the variables under study through measures of central tendency (mean, standard deviation and median). The Kolmogoroc-Smirnov test confirmed the sample normality. In order to detect differences among the weight categories, the mean



values of the sequential and temporal parameters of judo combat using one-way ANOVA were compared, applying post hoc test Tukey-b in the case of statistically significant differences. The same test was used to detect differences among visual categories (B1, B2 and B3), comparing the variable means of the study to all of the pairings of the competition (B1vsB1, B1vsB2, B1vsB3, B2vsB3, B2vsB2, and B3vsB3). Following the results obtained, and based on the claims of other authors (Krabben et al., 2018, 2019; Mashkovskiy et al., 2019) that indicate that there are differences between the completely visually impaired judokas (B1) and the judokas that are not completely visually impaired (B2 and B3), we restructured the data to obtain these two groups: matches of those that participated in judoka B1 and matches in which there were only B2 or B3. The comparison of the mean values of these two groups was performed using a t-test for independent samples. To avoid the negative effect of combat duration on the study variables, we conducted an ANCOVA analysis considering the duration of the combat as a co-variable

To determine which visual category won the most combats, we followed the procedure of other authors (Krabben et al., 2018, 2019; Mashkovskiy et al., 2019), excluding combats between judokas from the same visual category from the analysis. The difference of victories between visual categories in the different pairings (B1vs B2, B1vs B3, B2 vs B3) was established through the Chi-square.

In all statistical tests, a level of significance of  $p < 0.05$  was considered. In addition, we analyzed the effect size through Cohen's  $d$  (Cohen, 1988) to determine the intensity of the differences found between the combats with and without B1. In the argument, we also analyzed the effect size through Cohen's  $d$  (Cohen, 1988) to determine the intensity of the differences between the results of the 2018 World Championship and the results of the 1998 World Championship.

To determine the exact sequentiality of the sequential parameters of the combats, an analysis was done of the t-patterns with Theme v.5.0. (Magnusson, Burgoon, & Casarrubea, 2016) with a level of significance of 0.005. This software reveals hidden structures and unobservable aspects of the behaviors (Casarrubea et al., 2018).

### **3. Results**

#### ***3.1. General Analysis and Weight Categories***

Of the 94 women who participated in the study, 19.15% (n=18) were B1 judokas, 44.68% (n=42) were B2 and 36.17% (n=34) were B3. All of the combats were analyzed (n=133), this being their distribution by weight category: n=24 in 48 kg, n=19 in 52 kg, n=23 in 57 kg, n=22 in 63 kg, n=21 in 70 kg and n=24 in +70 kg.

Table 2 shows the sequential and temporal parameters of judo combats (from a general point of view and by weight category). The comparison of these variables between distinct weight categories shows that statistically significant differences were found in the total time of a standing fight, the ground total time, the total time of the combat, the number of total sequences of a standing fight and the time of a sequence of a standing fight.

\*\*\*Table 2 near here\*\*\*

In all of the weight categories, except for 70 kg, the pause time is greater than the fight time. Additionally, we observed that the judokas used the paused time to move to the starting place (44%), and to grip one another before the restart of the fight (39%), the time dedicated to other aspects like imposing a sanction, consulting the video referee, tying their belt, or receiving medical attention being very little (17%), the stated proportions being similar among the distinct weight categories.

### **3.2. General Analysis of the Different Minutes of a Combat**

The percentage of combats that finished in the first minute is 36.8% (n=49), 27.1% (n=36) during the second minute, 18% (n=24) during the third minute, 15% (n=20) during the last minute, and only 3% (n=4) competed in the golden score. The combats that finished before using up the maximum time allowed was 89.5% (n=119) and really only 10.5% (n=14) used up the aforementioned time. There were significant statistical differences between both ( $\chi^2 = 82.895$ ,  $p < 0.0005$ ).

Taking into account that really only 10.15% of the combats took up four minutes and that the proportion of the combats that finished in the distinct minutes were not the same, it was necessary to analyze the different temporal parameters and the sequences of the combat in the distinct minutes of the combat (1<sup>st</sup> minute, 2<sup>nd</sup> minute, 3<sup>rd</sup> minute and 4<sup>th</sup> minute). Table 3 shows the sequential and temporal parameters of the judo combat during the different minutes of the combat.

\*\*\*Table 3 near here\*\*\*

The comparison between the different minutes of the combat shows that they found statically significant differences during the paused time (as the fight progressed, the breaks were longer), the time of displacement during the pause (as the fight progressed, the time was greater), the number of total sequences while standing in a fight, the time of a pause sequence and the time of displacement of a pause sequence (in the last two, as the fight progressed, the time was greater).

### **3.3. General Analysis of a Combat Depending on the Visual Category (B1, B2 and B3)**

In order to study the existence of differences between the different visual categories (B1, B2 and B3) a comparison was made between all possible matches of the competition (B1vsB1,

n=4, 3%; B1vsB2, n=18, 13.5%; B1vsB3, n=12, 9%; B2vsB3, n=47, 35.3%; B2vsB2, n=31, 23.3% and B3vsB3, n=21, 15.8%), confirming that there were no statistically significant differences in any of the study's variables (see Table 4). Even so, we believe that there are differences between the totally visually impaired judokas (B1) and the judokas that are not completely visually impaired (B2 and B3). Therefore, we restructured the data to make two groups: combats in which those that participate are B1 judoka (n=34) and combats in which there are only B2 or B3 (n=99).

\*\*\*Table 4 near here\*\*\*

Table 5 shows the sequential and temporal parameters of the judo combats between these two groups. The comparison between both groups shows that they found statistically significant differences in the total combat time, the total pause time, the displacement time during the pause, the gripping time during the pause, the total sequences of standing fights and the total pause sequences, the highest values in combats being where B1 judokas do not compete in all of the cases. The effect size analysis (Cohen's *d*) shows us that the differences between both groups are small.

\*\*\*Table 5 near here\*\*\*

After performing the former analysis, we observed that the behavior of certain variables was strange (the variables were determined by the duration of the combat). Therefore, we performed an ANCOVA analysis, considering the duration of the combat as co-variable and we found that, by stabilizing the duration of the combat to all subjects equally, the differences indicated before ceased to exist. This circumstance is also observed when performing the previous analysis in the different minutes of combat (Table 5). Like so, there are no differences in the first minutes of the combat, and they only appear as the match advances. Therefore, the duration of the combat determines the statistically significant

differences that were initially found, and it implies that the only parameter that we should consider to be different between both groups is the total duration of the combat, that being shorter for the B1 judokas.

To finally determine if there is inequality between the different visual categories, it is necessary to know the results of these combats. Therefore, we made a comparison of the victories among the different possible pairings (B1 vs B2, B1 vs B3 y B2 vs B3), and we excluded the analysis of the matches between judokas in the same visual category. In the combats between B1 and B2 (n=18), B1 only won 16.7% and B2 won 83.3% of the fights, with there being a few significant differences ( $\chi^2 = 8.000$ ,  $p=0.005$ ). In the matches between B1 and B3 (n=12), B1 won 33.3% and B3 won 66.7% of the fights, and there were not any significant differences ( $\chi^2 = 1.333$ ,  $p=0.248$ ). In the combats between B2 and B3 (n=47), B2 won 55.3% and B3 won 44.7% of the fights, and there were not any significant differences ( $\chi^2 = 0.532$ ,  $p=0.466$ ).

#### **4. Discussion**

##### ***4.1. Changes in the temporal structure of judo combat in women with VI***

Currently, 89.5% of the combats finish before using up the maximum time allowed, an aspect that has increased, considering that it was 74% in 1998 (Gutierrez-Santiago et al., 2011).

If we compare our results with those obtained by Gutiérrez Santiago (2005) in the first IBSA Judo World Championship celebrated in 1998, we can verify which changes had the temporal structure of combat in women with VI. The results of the effect size (Table 6) determine the achievement of those changes.

\*\*\*Table 6 near here\*\*\*

The total time of the combat has suffered a different evolution in the different weight categories. Generally, the combats are shorter now (especially in +70 kg), except in 52 kg where they are quite long. Currently, the judokas with VI fight more time while standing (especially in the 52 and 70 kg weight category), an aspect that happens the other way around in 57 and +70 kg. On the contrary, the ground time was drastically reduced in all of the weight categories, except in 48 kg that has remained the same. Regarding the total pause time, the changes in regulations reduced the pause time in the judokas without VI (Miyake et al., 2014). These changes also had an effect on the athletes with VI, in such a way that currently the time in all of the categories was reduced (primarily with 48 and 70 kg) except with 52 kg that had a slight increase. Even still, the pause time in the judokas with VI keeps being greater in comparison to the judokas without VI, which confirms and maintains previous findings (Gutierrez-Santiago et al., 2011). Currently, the combat sequentiality (TSTDS, TGNDS and TPAS) was reduced in all of the categories (especially in +70 kg), except in 52 kg where it increased. The duration of the standing sequences increases in all of the categories (especially in 48, 52 and 70 kg). Generally, the duration of the ground fight sequences was reduced, except in 52 and 70 kg where it was increased. The duration of the pause sequences increased in all of the categories (substantially in 52 and +70 kg), except in 70 kg where it diminished considerably.

One limitation in the study was not being able to compare the 63 kg category of judokas with VI because there are no previous studies about it.

#### ***4.2. Visual Categories: Do They Compete in the Same Conditions?***

From 2007 to 2016, the percentage of B1 athletes decreased from 25.9% to 19.4% (Mashkovskiy et al., 2019), and it is still decreasing by 19.15%.

The results of this study showed differences between the distinct visual categories, the B1 judoka's combats being the shortest, and the same in recent studies (Kons et al., 2019). Currently, the B1 judokas win very few combats. Previously, the B1 judokas won 34.3% of the combats when they competed against B2 judokas (Mashkovskiy et al., 2019), but now they only win 16.7%. In the previously stated period, when the B1 athletes competed against B3 athletes, the B1 judokas won 16.1% of the combats (Mashkovskiy et al., 2019), and they presently win 33.3%. Additionally, the B2 judokas won 49.7% of the combats when they competed against B3 judokas (Mashkovskiy et al., 2019), and nowadays they win 55.3%.

All of this seems to indicate that the competition takes place in inferior conditions for the B1 judokas, something that has already been determined by other authors from another analysis perspective (Kons et al., 2019; Krabben et al., 2018, 2019; Mashkovskiy et al., 2019). Therefore, like the previous authors, we suggest that the conditions of the competition be matched in order to minimize the impact of the impairment on the outcome of the competition (Tweedy & Vanlandewijck, 2011). We consider it impossible to develop a separate competition, where each athlete competes with the judokas in their same visual category (there are not enough people). We propose that the conditions of the competition be matched, for example, blindfolding all of the judokas' eyes. Like recent studies (Kons et al., 2019), we consider that this study provides enough scientific evidence to clarify the existing relation between VI and sports performance, establishing concrete guidelines that will help determine the individually created training load for each athlete, things that are necessary so that new criteria can be developed based on the evidence for the classification of judo (Mann & Ravensbergen, 2018; Tweedy & Vanlandewijck, 2011).

### **4.3. Practical Applications**

The results of this study indicate that there are statistically significant differences in various temporary parameters and sequences in judo combat. This implies that the results cannot be generalized, and they will have to be individualized for each weight category. Thus, with these results, we can define a temporary structure “type” (Table 7) of judo combat in women with VI for each weight category. In order to indicate the exact distribution of the match fight sequences (standing and on the floor) and the pause sequences, we have conducted a T-  
Patterns analysis.

\*\*\*Table 7 near here\*\*\*

### **5. Conclusions**

The results achieved allow a temporal structure “type” to be defined for each weight category. Sports performance professionals can develop accurate and appropriate training for these athletes. Combat temporality of judo in women with VI has changed. There are differences among the different visual categories. The combats in B1 judokas are shorter. B1 judokas win few combats.

### **6. Disclosure statement**

The authors report no conflict of interest.

### **7. Acknowledgements**

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1 **Table 1.** Observational Instrument.

<b>Criteria</b>	<b>Category</b>	<b>Code</b>	<b>Description</b>
Weight	48	48	48 kilos Category
Category	52	52	52 kilos Category
	57	57	57 kilos Category
	63	63	63 kilos Category
	70	70	70 kilos Category
	+70	M70	More than 70 kilos Category
Visual	B1-B2	B1-B2	B1 judoka competes against a B2 judoka
Impairment	B1-B3	B1-B3	B1 judoka competes against a B3 judoka
	B2-B3	B2-B3	B2 judoka competes against a B3 judoka
	B1-B1	B1-B1	B1 judoka competes against a B1 judoka
	B2-B2	B2-B2	B2 judoka competes against a B2 judoka
	B3-B3	B3-B3	B3 judoka competes against a B3 judoka
Moment in the Combat	1st minute	3M	between 0'' and 60''
	2nd minute	2M	between 61'' and 120''
	3rd minute	1M	between 121'' and 180''
	4th minute	0M	between 181'' and 240''
	Golden Score	GS	Golden Score – Extra Time
STANDING Fight Sequences	1st standing sequence	STD1	1 <sup>st</sup> sequence of a standing fight
	2nd standing sequence	STD2	2 <sup>nd</sup> sequence of a standing fight
	3rd standing sequence	STD3	3 <sup>rd</sup> sequence of a standing fight
	4th standing sequence	STD4	4 <sup>th</sup> sequence of a standing fight
	Remaining standing sequence	etc.	Until the maximum sequences occur
PAUSE Sequence	1st pause sequence	PA1	1st pause sequence
	2nd pause sequence	PA2	2nd pause sequence
	3rd. pause sequence	PA3	3rd pause sequence
	Remaining pause sequence	etc.	Until the maximum sequences occur
Movements during the pause	Displacement	DISPL	Time spent searching for judoka to take it to the starting position and/or moving to the starting position.
	Grip	GRIP	Time spent from the starting position and gripping until the referee declares <i>hajime</i> after a pause.
	Other	OTHER	Time spent on other situations: belt tying, penalties, video checking, etc.
GROUND Fight Sequence	1st ground sequence	GND1	1st ground fight sequence
	2nd ground sequence	GND2	2 <sup>nd</sup> ground fight sequence
	3rd ground sequence	GND3	3 <sup>rd</sup> ground fight sequence
	Remaining ground sequence	etc.	Until the maximum sequences occur

2

3

1 **Table 2.** Descriptive Analysis (general combat –total- and by weight categories), ANOVA and degree of significance of the sequential and temporary  
 2 parameters of judo combat of women with VI.

Category	Total		Category												ANOVA		
			48 kg		52 kg		57 kg		63 kg		70 kg		+70kg		F	g/l	Sig.
	mean (s)	sd (s)	mean (s)	sd (s)	mean (s)	sd (s)	mean (s)	sd (s)	mean (s)	sd (s)	mean (s)	sd (s)	mean (s)	sd (s)			
TCT	208.31±	178.83	226.5	177.52	279.95	211.52	167.52	158.67	167.55	201.99	260	160.31	164.62	145.15	1.819	5	0.114
TSTDT	65.38	51.85	63.58	47.97	87.58 <sup>b</sup>	61.20	41.22 <sup>a</sup>	33.14	56.73	51.76	86.48 <sup>b</sup>	53.21	62.25	52.52	2.699	5	0.024*
TGNDT	47.03	37.78	56.55	43.13	54.44	39.28	43.68	35.35	39.59	36.74	61 <sup>a</sup>	40.02	26.65 <sup>a</sup>	21.58	2.404	5	0.041*
TFT	107.11	77.39	115.42	72.94	139.16	81.64	83	63.14	87.32	83.30	141.67	81.32	84.46	66.62	2.881	5	0.017*
TPAT	121.38	109.12	133.45	109.01	149.33	137.09	97.35	104.57	110.19	133.20	124.30	88.65	112.94	82.74	0.524	5	0.757
TPADT	57.29	50.58	64.55	48.08	72.67	64.06	46.30	49.16	50.75	58.27	58.85	44.19	49.71	38.97	0.729	5	0.603
TPAGT	50.68	47.43	51.75	42.32	66.67	66.33	38.60	41.41	47.13	54.63	51.60	40.60	49	37.22	0.684	5	0.636
TOPAT	22.14	23.9	28.73	30.44	13.69	10.13	25	28.81	25.13	31.51	23	21.57	20	22.31	0.548	5	0.739
TSTDS	5.11	3.97	5.25	3.85	7.53 <sup>a</sup>	5.46	4.70	4.05	4.05 <sup>c</sup>	3.59	5.57	3.06	4	3.04	2.320	5	0.047*
TGNDS	3.57	2.89	3.95	3.09	4.50	3.52	3.38	3.26	3.18	2.81	3.58	2.19	2.85	2.30	0.771	5	0.573
TPAS	5.01	3.95	5.15	3.67	6.94	5.51	4.35	4.25	4.25	3.61	4.95	2.96	4.35	2.98	1.207	5	0.311
STDST	13.55	7.51	13.30	7.32	12.26	5.35	9.21 <sup>a</sup>	3.84	14.40	6.16	15.81 <sup>d</sup>	7.13	16.20 <sup>d</sup>	11.05	2.875	5	0.017*
GNDST	14.35	10.2	14.85	7.53	13.32	8.35	16.28	18.55	13.19	5.27	17.84	7.89	10.34	5.42	1.323	5	0.260
PAST	23.2	7.36	24.81	5.87	20.31	4.15	21.20	5.67	22.29	7.17	23.71	8.07	26.98	10.75	2.102	5	0.071
PADST	11.02	2.98	12.22	2.88	10.09	2.44	10.53	2.91	10.99	3.68	11.18	3.47	11.01	2.18	1.125	5	0.352
PAGST	9.77	3.89	9.67	3.66	8.96	2.73	8.67	2.25	9.52	3.94	10.31	5.2	11.64	4.62	1.372	5	0.241
PAOST	3.83	5.24	4.06	3.38	1.73	1	3.95	4.12	3.68	2.65	3.68	3.64	6.04	10.43	0.841	5	0.526

3 \* significant differences present (p<0.05). <sup>a</sup>The category shows different significances to the other categories. <sup>b</sup>52 and 70 kg present significant differences to the remaining  
 4 categories. <sup>c</sup> 63 and +70 kg show significant differences to the other categories. <sup>d</sup>70 y +70 kg show significant differences to the remaining categories. Abbreviations: TCT =  
 5 Total Combat Time; TSTDT = Total Standing Time; TGNDT = Total Ground Time; TFT = Total Fight Time; TPAT = Total Pause Time; TPADT = Total Pause Displacement Time;  
 6 TPAGT = Total Pause Gripping Time; TOPAT = Total Other Pause Time; TSTDS = Total Standing Sequences; TGNDS = Total Ground Sequences; TPAS = Total Pause Sequences;  
 7 STDST = Standing Sequence Time; GNDST = Ground Sequence Time; PAST = Pause Sequence Time; PADST = Pause-Displacement Sequence Time; PAGST = Pause-Grip  
 8 Sequence Time; PAOST = Pause-Other Sequence Time.

1 **Table 3.** General descriptive analysis of combats during the different minutes, ANOVA and the degree of  
 2 significance of the sequential and temporary parameters of judo combat of women with VI.

	Combat Minutes								ANOVA		
	3M (n=133)		2M (n=60)		1M (n=48)		0M (n=24)		F	g/l	Sig.
	mean	sd	mean	sd	mean	sd	mean	sd			
Total standing time	32.21	16	26.44	14.61	30.53	16.68	26.22	13.64	2.275	3	0.080
Total ground time	21.15	11.97	22.06	12.76	21.85	14.27	23.18	12.67	0.187	3	0.905
Total fight time	49.70	16.82	43.65	18.59	46.02	20.18	46.38	18.87	1.701	3	0.167
Total pause time	47.41 <sup>ab</sup>	25.24	53.42 <sup>b</sup>	32.46	65.74	38.45	67.82	42.66	4.726	3	0.003*
Total pause displacement time	23.04	11.71	25.82	18.32	31.50	18.51	31.86	20.11	3.908	3	0.010*
Total pause gripping time	21.35	13.44	22.58	14.97	25.63	17.71	26.59	21.09	1.174	3	0.320
Total OTHER pause time	8.84	12.64	12.09	10.03	13.08	11.22	18.64	18.05	1.898	3	0.135
Total standing sequences	2.79	1.31	2.07	1.19	2.34	1.21	2.50	1.28	4.094	3	0.007*
Total ground sequences	1.79	0.90	1.66	0.86	1.82	0.80	1.62	0.74	0.480	3	0.696
Total pause sequences	2.20	1.05	2.09	1.14	2.45	1.27	2.41	1.40	0.880	3	0.452
Standing sequence time	13.26	9.64	16	10.49	15.03	8.10	13.18	8.82	1.267	3	0.286
Ground sequence time	13.15	8.71	16.15	11.01	14.21	12.14	15.61	9.36	1.228	3	0.300
Pause sequence time	22.01 <sup>ab</sup>	7.84	25.68 <sup>b</sup>	8.60	27.33	8.46	29.10	13.01	6.487	3	0.0005*
Pause-Displacement seq. time	10.73 <sup>ab</sup>	3.49	12.25 <sup>b</sup>	3.94	13.19	4.09	14.04	7.22	5.927	3	0.001*
Pause-Grip Sequence time	9.85	4.89	10.72	5.06	10.51	4.39	10.67	4.73	0.482	3	0.695
Pause-Other Sequence Time	4.15	6.26	5.30	4.42	5.51	4.64	8.96	10.84	1.716	3	0.169

3 \* significant differences present (p<0.05). <sup>a</sup> The first minute presents significant differences to the rest of the combat minutes

4 <sup>b</sup> The first and second minutes show significant difference to the last two minutes

5

**Table 4.** Descriptive analysis based on distinct matches, ANOVA and degree of significance of the sequential and temporary parameters of judo combat of women with VI.

Category	Visual Category												ANOVA		
	B1vsB2		B1vsB3		B2vsB3		B1vsB1		B2vsB2		B3vsB3		F	g/l	Sig.
	mean (s)	sd (s)	mean (s)	sd (s)	mean (s)	sd (s)	mean (s)	sd (s)	mean (s)	sd (s)	mean (s)	sd (s)			
TCT	163.94	160.56	134.50	130.92	211.13	185.82	91.25	80.41	255.52	198.53	234.81	168.04	1.530	5	0.185
TSTDT	52.67	52.42	44.72	50.63	66.06	53.82	34.75	22.47	71.45	58.75	79.05	45.09	1.025	5	0.406
TGNDT	53.43	49.19	31.73	25.63	44.20	34.47	32.33	21.50	57.29	38.58	44.76	40.70	1.006	5	0.417
TFT	94.22	76.47	81.50	68.52	104.62	79.01	59	46.14	123.19	84.07	123.81	70.62	1.151	5	0.337
TPAT	89.64	95.26	79.13	65.89	125.50	113.47	43.33	32.62	164.12	118.07	111.05	106.65	1.647	5	0.154
TPADT	39.36	35.38	43.50	34.37	56.08	52.30	24.33	17.62	81.64	57.28	52.52	48.05	2.015	5	0.082
TPAGT	37.86	38.54	33.13	27.73	53.42	51.75	19.67	15.53	65.04	54.25	48.05	41.22	1.188	5	0.320
TOPAT	24.43	30.40	10.50	7.78	25.64	24.84			22.78	20.99	15.57	24.81	0.520	4	0.721
TSTDS	3.67	2.91	3.33	3.28	5.19	4.23	2.75	1.71	6.23	4.70	5.95	2.97	1.992	5	0.084
TGNDS	3.36	2.95	2.27	2.10	3.39	2.87	2	1.73	4.50	3.39	3.75	2.45	1.275	5	0.280
TPAS	3.50	2.93	3.50	3.51	5.08	4.30	2.33	1.53	6.56	4.44	5	3.03	1.752	5	0.129
STDST	14.45	7.17	15.30	7.48	13.10	8.32	13.02	2.28	12.75	7.33	14.04	7.29	0.298	5	0.913
GNDST	15.63	8.74	14.41	6.34	13.87	7.08	18.33	7.51	16.13	16.80	11.30	5.45	0.674	5	0.644
PAST	24.11	6.33	24.22	4.88	23.65	9.03	17.58	2.40	24.02	6.34	21.18	6.69	0.825	5	0.534

Abbreviations: TCT = Total Combat Time; TSTDT = Total Standing Time; TGNDT = Total Ground Time; TFT = Total Fight Time; TPAT = Total Pause Time; TPADT = Total Pause Displacement Time; TPAGT = Total Pause Gripping Time; TOPAT = Total Other Pause Time; TSTDS = Total Standing Sequences; TGNDS = Total Ground Sequences; TPAS = Total Pause Sequences; STDST = Standing Sequence Time; GNDST = Ground Sequence Time; PAST = Pause Sequence Time.

**Table 5.** General descriptive analysis of combats with and without B1 (total combat and in the different minutes), t-test, degree of significance and the effect size of the sequential and temporary parameters of judo combat of women with VI.

<b>Total Combat</b>												
	B1		NO B1		Comparison		Cohen's <i>d</i>					
	mean	sd	mean	sd	t	Sig.	d	r				
TTC	145	142.01	229.77	185.76	-2.762	0.007*	-0.51	-0.248				
TTPI	50.47	44.32	70.51	53.45	-1.965	0.052						
TTS	42.64	39.54	48.40	37.34	-0.703	0.484						
TTW	85.59	70.02	114.51	78.74	-1.898	0.060						
TTPA	80.72	80.58	133.20	113.80	-2.591	0.012*	-0.53	-0.257				
TTPAD	38.88	32.90	62.64	53.63	-2.712	0.009*	-0.53	-0.257				
TTPAA	34.16	32.92	55.49	50.02	-2.506	0.015*	-0.50	-0.244				
TTPAO	21.33	27.18	22.26	23.61	-0.108	0.915						
STPI	3.44	2.88	5.68	4.14	-3.458	0.001*	-0.62	-0.299				
STS	2.79	2.53	3.82	2.97	-1.663	0.099						
STPA	3.36	2.93	5.49	4.09	-2.904	0.005*	-0.59	-0.286				
TSPI	14.58	6.79	13.19	7.75	0.928	0.355						
TSS	15.44	7.57	14	10.91	0.650	0.517						
TSPA	23.36	5.82	23.15	7.78	0.126	0.900						
<b>0 a 1 minute</b>						<b>0 a 2 minutes</b>						
	B1		NO B1		Comparison		B1		NO B1		Comparison	
	mean	sd	mean	sd	t	Sig.	mean	sd	mean	sd	t	Sig.
TTC	50,39	39,87	54,39	40,27	-,336	,738	139,50	36,98	172,70	52,70	-1,464	,152
TTPI	21,89	13,50	20,42	11,16	,411	,683	48,50	33,56	57,07	23,35	-,763	,451
TTS	16,25	5,69	15,43	8,23	,306	,761	42,17	28,29	37,45	21,85	,458	,650
TTW	32,72	17,91	31,87	15,74	,174	,863	90,67	16,17	93,27	16,92	-,346	,732
TTPA	35,11	21,46	37,42	26,21	-,230	,820	49,00	25,04	82,45	44,04	-1,788	,083
TTPAD	18,44	10,41	17,16	8,85	,340	,737	24,00	11,31	36,79	19,28	-1,559	,129
TTPAA	16,33	12,34	15,00	8,06	,344	,734	23,33	14,09	35,66	21,36	-1,345	,188
TTPAO	5,00		20,20	31,90	-,435	,686	11,00		13,74	16,69	-,160	,875
STPI	1,78	0,94	2,10	1,14	-1,006	,320	3,17	1,17	4,43	1,59	-1,844	,074
STS	1,17	0,39	1,41	0,73	-1,060	,297	2,17	0,98	2,79	1,18	-1,215	,233
STPA	1,56	0,73	1,79	0,92	-,670	,509	2,17	1,17	3,62	1,52	-2,200	,035*
TSPI	12,56	4,77	10,47	5,41	1,362	,180	15,45	9,16	13,84	7,23	,476	,637
TSS	14,54	5,69	11,65	6,65	1,273	,212	18,92	12,49	15,95	16,70	,409	,685
TSPA	22,26	7,04	20,83	10,59	,367	,717	23,21	4,51	22,22	5,97	,381	,706
<b>0 a 3 minutes</b>						<b>0 a 4 minutes</b>						
	B1		NO B1		Comparison		B1		NO B1		Comparison	
	mean	sd	mean	sd	t	Sig.	mean	sd	mean	sd	t	Sig.
TTC	249,29	61,62	325,35	116,85	-1,618	,120	480,33	130,61	450,71	75,27	,568	,577
TTPI	91,43	34,56	91,00	23,85	,035	,972	130,33	40,80	138,29	42,37	-,301	,767
TTS	59,57	42,19	61,82	23,83	-,133	,898	109,67	40,80	82,76	42,09	1,024	,319
TTW	151,00	22,78	152,82	20,66	-,191	,850	240,00	0,00	221,06	20,06	3,893	,001*
TTPA	98,29	44,43	172,47	107,22	-2,396	,026*	240,00	130,64	229,47	72,01	,208	,837
TTPAD	47,86	6,39	85,41	49,56	-3,063	,007*	109,00	43,71	107,82	33,45	,054	,957
TTPAA	40,86	29,31	70,29	45,57	-1,881	,077	93,67	45,50	94,29	46,60	-,022	,983
TTPAO	16,75	15,39	23,83	24,87	-,530	,605	36,33	45,08	27,41	20,97	,336	,767
STPI	4,71	0,95	7,94	3,34	-3,637	,002*	11,00	2,65	10,35	3,30	,320	,753
STS	3,57	1,62	4,59	2,18	-1,108	,280	8,67	2,08	6,59	3,26	1,053	,306
STPA	3,86	1,21	7,06	3,47	-2,354	,028*	10,00	2,65	9,59	3,18	,210	,836
TSPI	19,96	7,89	14,94	11,98	1,015	,321	12,39	4,90	14,50	5,97	-,576	,572
TSS	15,23	6,86	14,74	7,12	,155	,878	12,59	3,14	13,13	6,03	-,150	,882
TSPA	24,99	4,16	24,29	8,43	,209	,837	23,19	9,51	24,39	4,72	-,352	,729

\* p<0.05. Expression of the effect size: *d* y *r*, *d*<0.2 (null), *d*=0.2-0.49 (small), *d*=0.5-0.80 (moderate) y *d*>0.8 (large). Abbreviations in table 2.



**Table 6.** Results of the effect size comparing our results with the results of the first IBSA Judo World Championship celebrated in 1998 (Gutiérrez-Santiago, 2005)

	Total		48 kg		52 kg		57 kg		70 kg		+70 kg	
	d	r	d	r	d	r	d	r	d	r	d	r
<b>TCT</b>	-0.179	-0.073	0.013	0.005	0.723	0.306	-0.406	-0.183	-0.266	-0.110	-1.017	-0.377
<b>TSTDT</b>	0.220	0.089	0.230	0.092	1.103	0.439	-0.254	-0.116	0.579	0.234	-0.571	-0.223
<b>TGNDT</b>	-0.931	-0.341	0.013	0.005	-0.482	-0.183	-1.933	-0.637	-0.398	-0.159	-2.155	-0.653
<b>TFT</b>	-0.146	-0.059	0.082	0.033	0.834	0.347	-0.634	-0.280	0.257	0.106	-1.130	-0.412
<b>TPAT</b>	-0.448	-0.171	-0.849	-0.275	0.305	0.117	-0.537	-0.229	-0.938	-0.351	-0.504	-0.216
<b>TSTDS</b>	-0.356	-0.143	-0.226	-0.090	0.562	0.242	-0.494	-0.222	-0.233	-0.097	-1.345	-0.474
<b>TGNDS</b>	-0.438	-0.182	-0.247	-0.101	0.242	0.108	-0.576	-0.260	-0.467	-0.195	-1.105	-0.422
<b>TPAS</b>	-0.148	-0.063	-0.037	-0.016	0.636	0.275	-0.336	-0.156	-0.119	-0.050	-0.949	-0.385
<b>STDST</b>	0.829	0.319	0.870	0.329	1.608	0.581	0.233	0.106	1.072	0.407	0.582	0.227
<b>GNDST</b>	-0.100	-0.039	-0.403	-0.163	0.351	0.134	-0.024	-0.010	0.518	0.206	-0.734	-0.282
<b>PAST</b>	0.265	0.102	0.429	0.143	1.177	0.413	0.569	0.242	-0.942	-0.353	0.988	0.398

*Note.* Expression of the effect size: *d* y *r*,  $d < 0.2$  (null),  $d = 0.2 - 0.49$  (small),  $d = 0.5 - 0.80$  (moderate) y  $d > 0.8$  (large). Abbreviations in table 2.

**Table 7.** Temporary structure “type” of judo combats of women with VI in different weight categories.

<i>48 kg</i>	<i>Time</i>	<i>52 kg</i>	<i>Time</i>	<i>57 kg</i>	<i>Time</i>	<i>63 kg</i>	<i>Time</i>	<i>70 kg</i>	<i>Time</i>	<i>+70 kg</i>	<i>Time</i>
<b>CS</b>		<b>CS</b>		<b>CS</b>		<b>CS</b>		<b>CS</b>		<b>CS</b>	
1st STD	13.30	1st STD	12.26	1st STD	9.21	1st STD	14.40	1st STD	15.81	1st STD	16.2
1st GND	14.85	1st GND	13.32	1st GND	16.28	1st Pause	22.29	1st GND	17.84	1st Pause	26.98
1st Pause	24.81	1st Pause	20.31	1st Pause	21.2	2nd STD	14.40	1st PAUSE	23.71	2nd STD	16.2
2nd STD	13.30	2nd STD	12.26	2nd STD	9.21	1st GND	13.19	2nd STD	15.81	1st GND	10.34
2nd GND	14.85	2nd Pause	20.31	2nd GND	16.28	2nd Pause	22.29	2nd Pause	23.71	2nd pause	26.98
2nd Pause	24.81	3rd STD	12.26	2nd Pause	21.2	3rd STD	14.40	3rd STD	15.81	3rd STD	16.2
3rd STD	13.30	2nd GND	13.32	3rd STD	9.21	2nd GND	13.19	2nd GND	17.84	2nd GND	10.34
3rd GND	14.85	3rd Pause	20.31	3rd GND	16.28	3rd Pause	22.29	3rd Pause	23.71	3rd Pause	26.98
3rd Pause	24.81	4th STD	12.26	3rd Pause	21.2	4th STD	14.40	4th STD	15.81	4th STD	16.2
4th STD	13.30	3rd GND	13.32	4th STD	9.21	3rd GND	13.19	3rd GND	17.84	3rd GND	10.34
4th GND	14.85	4th Pause	20.31	4th Pause	21.2	<b>CE</b>		4th Pause	23.71	4th Pause	26.98
4th Pause	24.81	5th STD	12.26	5th STD	9.21			5th STD	15.81	5th STD	16.2
5th STD	13.30	5th Pause	20.31	<b>CE</b>				4th GND	17.84	<b>CE</b>	
<b>CE</b>		6th STD	12.26					5th Pause	23.71		
		4th GND	13.32					6 <sup>a</sup> STD	15.81		
		6th Pause	20.31					<b>CE</b>			
		7th STD	12.26								
		7th Pause	20.31								
		8th STD	12.26								
		<b>CE</b>									

CS= Combat Star; STD= Standing Sequence; GND= Ground Sequence; CE= Combat End.