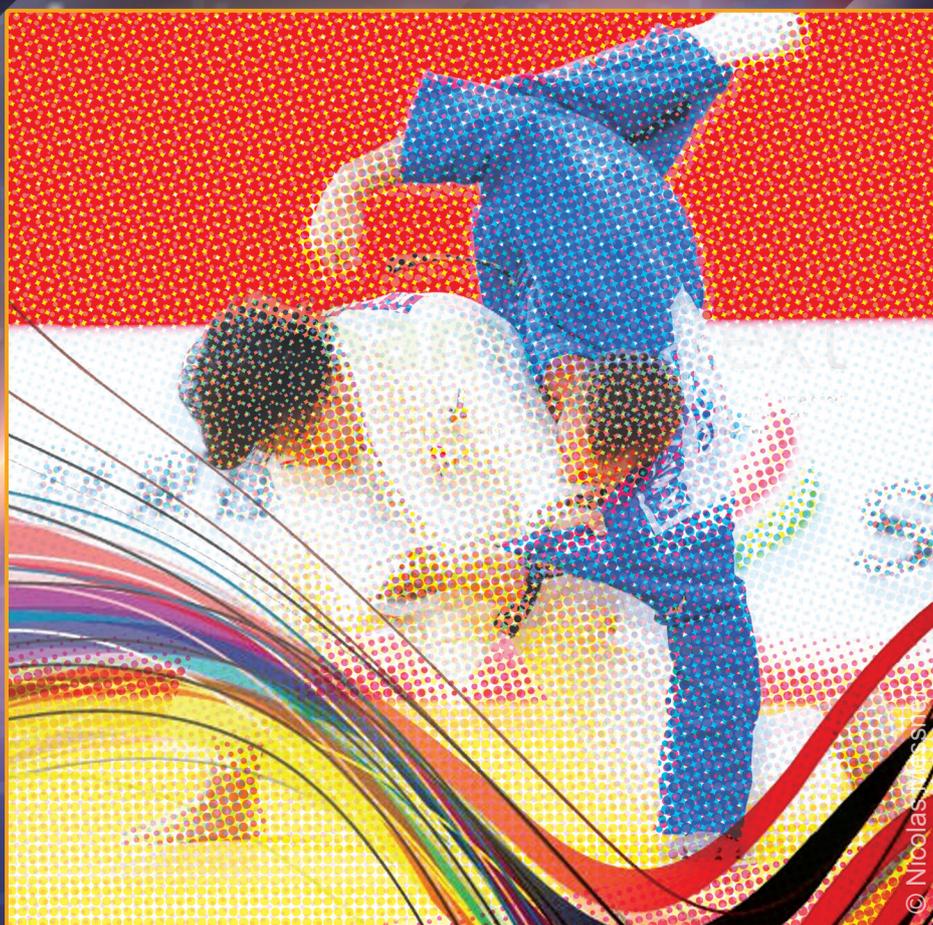




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The Effects of Judo Rule changes on Contestants' Performance: Paris Grand Slam Case Study

By Nuša Lampe¹, Husnija Kajmović², Jožef Šimenko³ & Fikret Bečić⁴

Abstract: *The International Judo Federation (IJF) has changed the rules many times to protect athletes, increase the intensity of the contest, provide equal opportunities for all athletes, and encourage greater media coverage. This research aims to determine the effects of changes in judo rules on contestants' performance via time, techniques, penalty distribution and attack efficiency indexes at the Paris Grand Slam between 2020 and 2022. The sample is comprised of (n=295) male fights from Paris GS 2020 and (n=152) female fights from Paris GS 2022, as well as (n=427) female fights from Paris GS 2020 and (n=175) male fights from Paris GS 2022 encompassing contestants in all seven weight categories for each gender. The results have shown some specific differences in female and male senior contestants in individual penalties and in senior contestants' technique subgroups. However, regarding the overall attack index, no specific effects were discovered, as well as the attacking efficiency index in individual throwing and ground techniques. For senior female contestants, yoko shiho gatame, uchi mata and ōuchi gari have remained the top three most efficient techniques but exhibited different efficiency indexes in the two competitions. In senior male contestants, the most successful techniques in Paris GS 2020 were seoi nage, sumi otoshi and uchi mata, while in Paris GS 2022 they were sode tsurikomi goshi, ōuchi gari and uchi mata. Based on the results, one can notice specific effects on contestants' performances, indicating that coaches and contestants must adapt quickly to the new rules during training and competitions.*

Keywords: *combat sports; sports regulation; gender; transformation; analysis; efficiency*

Rules are regulations that determine all necessary conditions to be met so contestants can compete. In addition, rules determine specific relationships between participants at competitions (athletes, referees, coaches, public), their relationships to the competition area and equipment, and adaptation to the fight period (Arias, et al., 2011). Angus (2006) highlights that the rules in judo are important as they protect contestants from getting hurt, provide equal opportunities for all contestants to perform their best and with the greatest intensity during fights, and present a friendly sport for the audience. Today's commercialisation and globalisation force the International Judo Federation (IJF) to follow the newest trends present in every segment of life. Factors significantly influencing changing judo rules are media influence, competition attractiveness, technological development and contestants' ability at different competition levels (Lampe, 2015).

Due to the development of athlete performance and the vision of coaches, IJF refereeing rules are seen in an 'endless' document which aims to keep the essence of *Kōdōkan* judo within modern-day judo (Lascau, 2022). Another interpretation is that judo rules not only protect athletes and sport in general but also promote it as a dynamic and attractive sport to the public and media (Barta, 2022). For an easier understanding of the development of judo rules after the Second World War, when judo started to be widely reco-

gnised, a chronological overview is presented (Brousse & Matsumoto, 2002; Hargrave, 2003; Hoare, 2009; Lampe, 2015; IJF, 2008,2009,2010, 2013,2015,2017,2018, 2020, 2022; Bareto, et al., 2022). In 1950 leg and neck locks were forbidden. In 1957 three weight categories were introduced: -68kg, -80kg and +80kg. In 1960 standardised referee terminology was introduced in the Japanese language along with referee uniforms. In 1965 new weight categories were introduced -63kg, -70kg, -80kg, -93kg, +93 kg and an open category. In 1967 five new weight categories were introduced along with the open category. For *hajime* at the beginning of the fight, a hand gesture was no longer used.

In 1972 a 1 metre wide red boundary line was introduced to indicate a warning zone, followed by a protective area 2.5 metres wide. Additionally, the scoreboard for points and penalties was introduced. The role of assistant referees became more prominent, as they were given the right to oppose the main referee in cases of noticing mistakes or disagreements when assigning points. In 1974 *yūkō* and *kōka* were introduced as mid-level technical points, with *shidō* and *chūi* as mid-level penalties. Before these changes, referees had to remember all techniques and points during the fight. The duration of contests was extended from six to eight minutes and the semi-final and final fights to ten minutes. In the case of a tie, the winner would be the contestant with the lower number of penalties. In 1975 kneeling was no longer allowed in the

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case of *keikoku* penalty or while fixing the judogi. In 1976 rules on penalties were more clearly defined, penalties were standardised for forbidden actions. Additionally, falling backwards with the opponent clinging to one's back assigns higher technical scores for the opponent with a potential risk of neck and head injury. While transitioning from *newaza* to *tachi waza*, the fight pauses.

In 1977 weight categories for men were: -60kg, -65kg, -71kg, -78kg, -86kg, -95kg, +95 kg. In 1978 a throwing technique in which the performer 'head dives' into the tatami was punishable by disqualification (*hansoku-make*) due to the potential for head, neck and spinal injuries. Medical assistance for a contestant was allowed for five minutes to help with the injury. The rule by which, in the case of a tie, a contestant with fewer penalties was awarded victory, was abandoned. Again, referee voting to announce victory was introduced (*hantei*). In 1979 eight weight categories were introduced: -60kg, -65kg, -71kg, -78kg, -86kg, -95kg, +95kg and open category. *Jūdōgi* control was introduced for all, prior to competition, with additional rules for tidying long hair and wearing the correct colour of t-shirt for female contestants. Also, a double repechage system was introduced, which enabled those defeated in the first round to be able to take third place after being victorious in the repechage. In 1992 women's weight categories were introduced for the first time at the Olympic Games, in Barcelona: -48kg, -52kg, -56kg, -61kg, -66kg, -72kg and +72kg. In 1997 the weight categories for male seniors were changed to: -60kg, -66kg, -73kg, -81kg, -90kg, -100kg, +100kg. For female seniors the weight categories were adapted to: -48kg, -52kg, -57kg, -63kg, -70kg, -78kg, +78kg. Additionally, wearing blue and white *jūdōgi* was introduced so the contestants would be easily recognisable on television. The first contestant called wore blue *jūdōgi*, while the second wore white.

In 2003, in the case of a tied result, golden score was introduced and this overtime period was limited. If the scores were still tied, the referee would decide the winner by *hantei*/decision. In 2006 the system of penalties changed to include only two penalties: minor (*shidō*) and grave penalty (*hansoku make*). In 2007 the red boundary line was eliminated so that the contestants' area was divided into only two parts: a contest area (from 8X8m to 10x10m) and a safety area at least 4 metres wide. Where two or more adjoining contest areas were used, a common safety zone was allowed, to satisfy the minimum distance of 4m between them. In 2008 the lowest technical score was removed (*koka* - 3 points). In 2010 the International Judo Federation (IJF, 2009) made a decision to forbid all throwing techniques with gripping below the belt and to disqualify contestants in cases against the rule (*hansoku make*). The golden score period was shortened from 5 to 3 minutes. *Koka* (3 points) was eliminated and *shido* penalties were scored differently: *shidō* (no result), *shidō* = *yūkō*, *shidō* = *waza ari* and *shidō* = *ippon*. Scoring in *osaekomi* situations was as follows: 15-19 seconds = *yūkō*, 20-24 seconds = *waza ari*, and 25 seconds = *ippon*. *Shidō*

could be given for: avoiding holding an opponents' *jūdōgi*, taking a defensive stance or unconventional grip without any immediate attack, preventing the opponent from holding a *jūdōgi* for longer than 5 seconds, interlocking the opponent's fingers from one or both hands, pulling the opponent downwards to the floor with no intention to throw, a false attack or deliberately loosening one's own *jūdōgi* or belt without the referee's permission. In 2010, Computer Assisted Refereeing (Care) System technology was introduced to start the analysis of referees' decisions and to improve objectivity. Three referees remain in the contest area and in the case of a dispute, it would be analysed by a referee commission. In 2011 the rule of wearing blue and white *jūdōgi* was changed: the first contestant would wear the white *jūdōgi* and the second one a blue *jūdōgi* (white *jūdōgi* is traditional and the first *judoka* called to a contests are usually the best competitors). In 2013 there was only one referee on the tatami, while two assistant referees were sitting at the table with video surveillance, staying in contact with the main referee via radio communications. All techniques involving grabbing the legs in *tachi waza* were forbidden. A referee deciding on the winner (*hantei*) was revoked and the golden score period was limitless.

The time for performing a pinning technique (*osaekomi waza*) was reduced to 20 seconds for *ippon*, 15-19 seconds for *waza ari* and 10-14 seconds for *yūkō*. In cases where *judoka* initiated *osaekomi waza* within the contest area and later went outside, they were considered valid. Penalties no longer brought extra points, as in 2013, but if the fight ended as a tie, an athlete with the higher penalty points would lose. New penalties were awarded for different inappropriate grips (*kumikata*). In 2015 the fight lasted for 5 minutes. *Jūdōgi* checks ensured *jūdōgi* sleeves covered the entire arm, including wrists, unlike before when there was 5 cm tolerance allowed. The weigh-in was the day before the competition but athletes were weighed again on the day of the contest. In this second weigh-in, athletes were not allowed to exceed their weight category by more than 5% (IJF, 2015). Additionally, in 2015 an update to athletes' entry to the competition arena was introduced where the venue speaker(s) announced the players as they entered the FOP and also the result of the contest. If the athlete entry is from the left of *jōseki*, the first athlete called is the one in the blue *jūdōgi*, followed by white. If they enter from the right, the first athlete is called in the white *jūdōgi*, followed by blue *jūdōgi*, (IJF, 2015).

In 2017 the fight duration was shortened to 4 minutes for both men and women. Additionally, *yūkō* was eliminated from the scoring and only *ippon* and *waza ari* scores remained. Situations that once were declared *yūkō* were now *waza ari*, and two *waza ari* were no longer regarded as *ippon*. For *ippon* in *osaekomi*, it was necessary to hold for 20 seconds and for *waza ari* from 10 to 19 seconds. *Shidō* penalties were reduced to 3 per person, per fight (3 *shidō* = *hansoku make*) and it was possible to apply the points and penalties simultaneously. The winner was de-

terminated by either a technical result or the greater *shidō* accumulation. While still in a position to get the point, *judoka* had the opportunity to remain in a gripping exchange for up to 45 seconds without penalties. All unconventional gripping positions (pistol grip, pocket grip, belt grip, one side grip, cross grip) were allowed only with an immediate attack, otherwise an athlete would be penalised by *shidō*. The first leg grip in *tachi waza* was punishable with a *shidō* and the second with *hansoku make*. Leg grips were allowed in *newaza* (both athletes should have both knees on the ground) and if any technique which was initiated while standing, it was terminated. Athletes outside the contest area with one leg would be penalised if there was no immediate attack or if they did not return to the contest area. In cases when an athlete initiated *osaekomi waza* within the contest area and then left this area while the opponent could evade his immobilisation in a continuous movement, this action would be awarded points. Each situation of falling while clinging to one's back to avoid the opponent from getting points is considered an *ippon*. In situations where a *sutemi waza* technique was applied as a counterattack, the *judoka* who falls first on to the mat could not score unless there was clear control of the movement during the throw. Since 2018 two *waza ari* were equivalent to *ippon* (*waza ari awasete ippon*) and *shidō* no longer decided the winner in golden score. In order to get *ippon* for a specific throwing technique, 4 criteria had to be met: speed, force, landing on the back and controlled until the end of the landing. The use of the head to avoid falling was penalised with *hansoku make*, except in cases where the action was unintentional, which happens with throws which are hard to avoid; one hits their head on the floor (*seoi otoshi*, *sode tsurikomi goshi*, *koshi guruma*). Grabbing a leg or *jūdōgi* trousers was penalised with *shidō*. In the case of performing *shime waza* by using excessive force over-stretching the opponent's leg, the fight would be interrupted to come closer to the opponent's head. If there was no score and a sustained lack of action by both athletes, it was possible to punish them with a double *hansoku make* and both athletes would be disqualified from the competition.

In 2020 if there were throw interruptions or if it was performed on one side of the body, it could only be considered as *waza ari*. The *seoi nage* technique became a part of the rule that an athlete was not to be penalised in the case of unintentionally hitting their head on the mat during the throw. *Osaekomi waza* performed with arms and legs around the neck, without control of the opponent's arms or shoulders, had to be stopped. Performing the *kata sankaku* manoeuvre with the intention to throw the opponent would be penalised with *hansoku make* and if it was initiated in *newaza*, the fight had to be stopped.

By the beginning of 2022, the International Judo Federation presented new judo rules for the Olympic cycle 2022-2024 (IJF, 2022), by adopting 12 decisions. The advantage of the IJF rules update was the continuity of the action, landing and applying judo techniques in an accep-

ted *gokyō* system. This also applied to explanations for *waza ari*, new penalties, the possibilities of skilful *kumikata* changes, and the safety of *judoka*, especially when using their heads during throwing techniques (Messner, 2022).

The effects of rules changing in judo from the technical and tactical aspects, points, penalties, fight dynamics, grips (*kumikata*), and the performances of both genders at different competition levels were subjected to a significant amount of research (Boguszewski, 2011; Adam, et al., 2011; Franchini, et al., 2013; Gonçalves et al., 2015; Miyake et al., 2016; Ceylan & Balci, 2017; Calmet et al., 2017; Callan & Claes, 2018; Calmet et al., 2018; Katicips et al., 2018; Dal Bello et al., 2019; Stanković et al., 2019; Pan et al., 2021; Brabec et al., 2021; Kajmović et al., 2022 and Barreto, et al., 2022).

The Paris Grand Slam (formerly 'Tournoi de Paris Ile-de-France'), the beginnings of which date back to 1971, is regarded as one of the most prestigious grand slam competitions. The IJF recognised it as a Super-A tournament and it changed its name in 2002. The Paris Grand Slam has also been subjected to investigations re the effects of rule changes in judo, such as the research by Katicips, et al. (2018), who analysed the effects of rule changes at the Paris Grand Slam, comparing three editions (2011, 2016 and 2017). Therefore, the Paris Grand Slam is considered the event where the effects of rule changes at the highest level are most evident and tested. Thus, this research aims to determine the effects of judo rule changes on competitors' performances with specific reference to time, techniques, penalty distribution and attack efficiency indexes at a Paris Grand Slam.

METHODS

Sample

Video analysis of contests was used throughout the study. The sample included the following gender and category breakdown:

In women's categories, n=295 for Paris GS 2020 and n=152 for Paris GS 2022. The distribution of analysed contests by weight category was: -48kg (n=37), -52kg (n=43), -57kg (n=53), -63kg (n=44), -70kg (n=45), -78kg (n=31), +78kg (n=42), for Paris GS 2020. At the 2022 edition it was: -48kg (n=19), -52kg (n=21), -57kg (n=29), -63kg (n=25), -70kg (n=23), -78kg (n=18), +78kg (n=17).

In men's categories, n=427 for Paris GS 2020 and n=175 for Paris GS 2022. The distribution of analysed contests by weight category was: -60kg (n=46), -66kg (n=69), -73kg (n=79), -81kg (n=73), -90kg (n=64), -100kg (n=53), +100kg (n=43), for Paris GS 2020. At the 2022 edition it was: -60kg (n=21), -66kg (n=25), -73kg (n=34), -81kg (n=26), -90kg (n=26), -100kg (n=24), +100kg (n=19).

Sample Variables

Variables used in the analysis were:

1. Fight duration (time)
2. How the fight ended (with a decision before regular time, with a difference in positive scores at the end of the 4-minute contest duration, or in golden score)
3. Points and penalties
4. Individual distribution of penalties
5. Overall attack efficiency index in *nage-waza* and *nawa-za* (Sa)
6. Subgroups of judo techniques
7. Attack efficiency index (AEI) of each individual throwing and grappling technique (Kawamura & Daigo, 2000).

Data Collection Method

The data was collected using notational analyses of video recordings of contests from the Paris Grand Slams of 2020 and 2022, taken from the platform <https://judobase.ijf.org>. Each variable was assessed by two observers who had been watching for: circumstances which forced a referee to assign points or penalties, movements of referee's hands when awarding points or penalties, the scoreboard which highlighted the duration of the match. Observers met the following criteria: twenty years of competitive judo, coaching experience, minimum grade of 4th dan, referee, judo researcher.

Ethical Issues

All the data used for analysis was taken from the official website (www.judobase.org) of the IJF. The data was obtained in a secondary form and not generated by experimentation. Additionally, personal identification or countries of the athletes whose matches were analysed were not reported. Therefore, there is no ethical issue with using or interpreting the data (Morley & Thomas, 2005, Calmet et al., 2017, Ceylan et al., 2021).

Reliability

For reliability purposes, observers' analysis of final block contests for female and male contestants (final, bronze medal contests, semi-finals and two repechage fights) were compared. In total, seven fights for each weight category were included. The reliability (Cohen Kappa) between two observers regarding female competitors was .970 and for male competitors it was .954. This indicated the high level of inter-rater reliability between observers.

Statistical Data Analysis

Data was analysed with the help of the T-test for independent samples and Pearson's chi-squared test (Field, 2005). For the analysis of the strength of the relationship, Cramer's V test was used. For all the tests a significance of $p < 0.05$ was considered. Data was processed using SPSS 22.0 Premium (IBM Corporation, Armonk, USA).

For determining the overall efficiency index (Sa) between the throwing techniques and groundwork techniques for female and male senior competitors, the formula (1) from Adam, Smuraj, & Tyszkowski, (2011) was used.

$$Sa = M/n \quad (1)$$

Where M = total number of points, n = the number of contests.

The attack efficiency index (AEI) for each throwing technique performed successfully and each groundwork technique performed successfully was calculated with the help of formula (2) by Adam, Klimowicz & Pujszo (2016).

$$AEI = 7 \times M + 10 \times M / n \quad (2)$$

In which case:

7 points = *waza ari*

10 points = *ippon*

M = the number of effective attacks

n = the number of analysed fights.

Results

T-test results indicated that there are no statistically significant differences between the duration of fights in (Figure 1) Paris GS 2020 female contestants (M=3.02; SD= 1.71; Paris GS 2022 M=3.36; SD= 2.06; $t = -1.846$, $df = 436$, $p = .066$) and in (Figure 2) male contestant Paris GS 2020 (M=3.13; SD= 1.71; Paris GS 2022 M=3.41; SD= 1.97; $t = -1.764$, $df = 593$, $p = .078$).

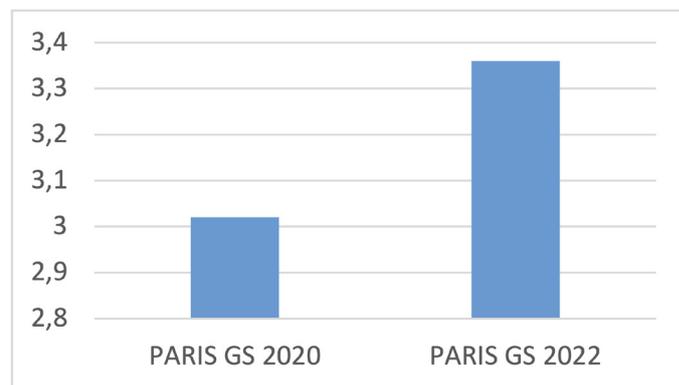


Figure 1. Fight time in minutes - female

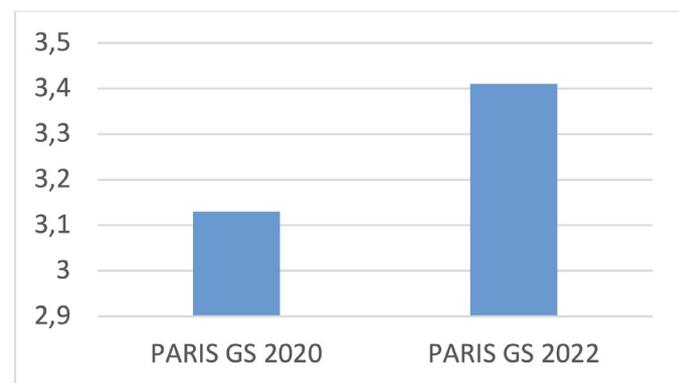


Figure 2. Fight time in minutes - male

The results of the Paerson Chi-square test indicated significant differences (Figure 3) in the way female competitors' contests ended ($\chi^2 = 6.29$, $df = 2$, $Sig = .043$, Cramer's $V = .120$, $Sig = .043$) while for male competitors (Figure 4) these differences were not present ($\chi^2 = 2.63$, $df = 2$, $Sig = .268$, Cramer's $V = .067$, $Sig = .268$).



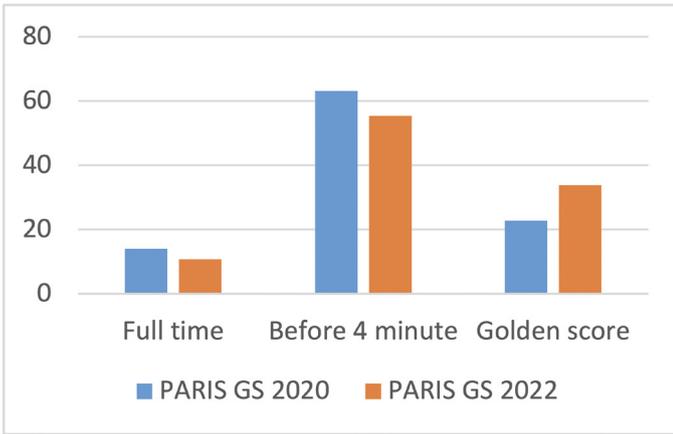


Figure 3. End of the fight - female

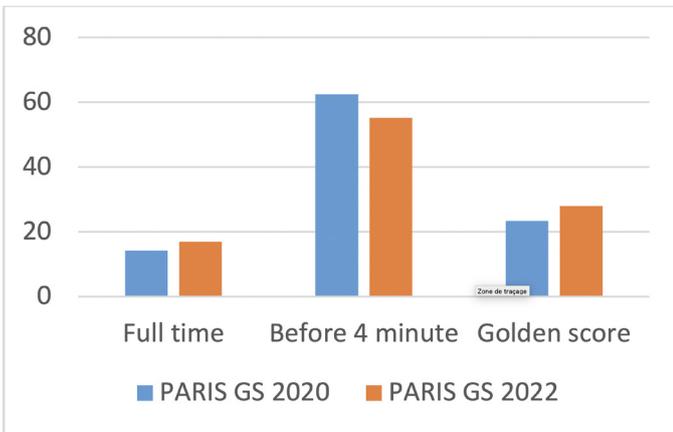


Figure 4. End of the fight - male

The results of Paerson Chi-square test have indicated no differences (Figure 5) in achieved points and penalties with female competitors ($\chi^2 = 7.467$; $df = 6$; $Sig. = .280$; $Cramers V = .075$; $Sig. = .280$) or male competitors (Figure 6) ($\chi^2 = 10.744$; $df = 6$; $Sig. = .097$; $Cramers V = .074$; $Sig. = .097$).

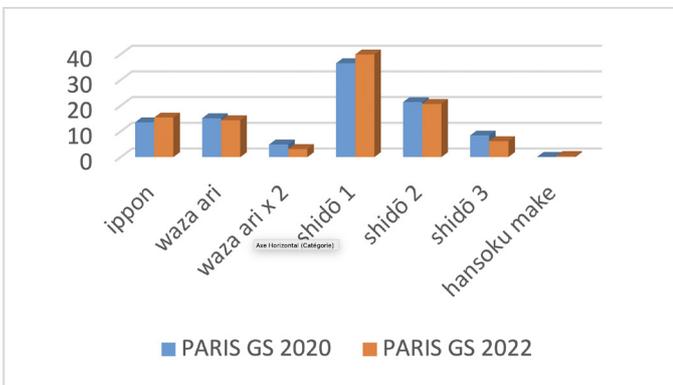


Figure 5. Points and penalties – female

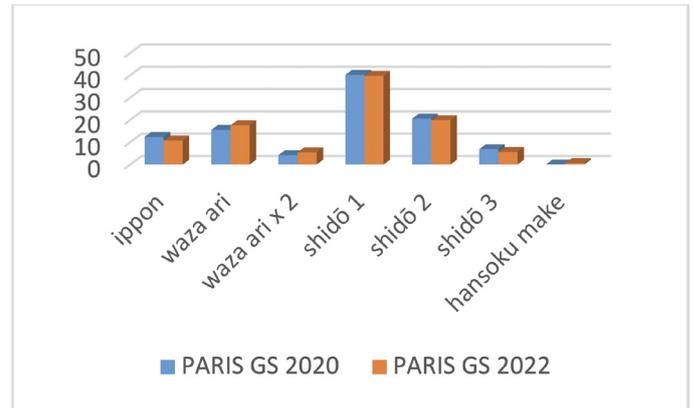


Figure 6. Points and penalties – male

Pearson chi-square test indicated that there are significant statistical differences (Figure 7 and Figure 8) in the variables of individual penalties in female competitors ($\chi^2 = 65,6$; $df = 19$; $Sig. = .000$; $Cramers V = .271$; $Sig. = .000$) and male competitors ($\chi^2 = 80,1$; $df = 21$; $Sig. = .000$; $Cramers V = .246$; $Sig. = .000$).

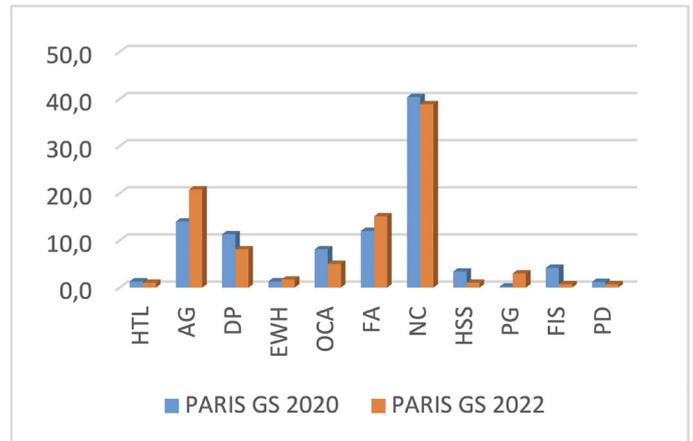


Figure 7. Individual penalties - female

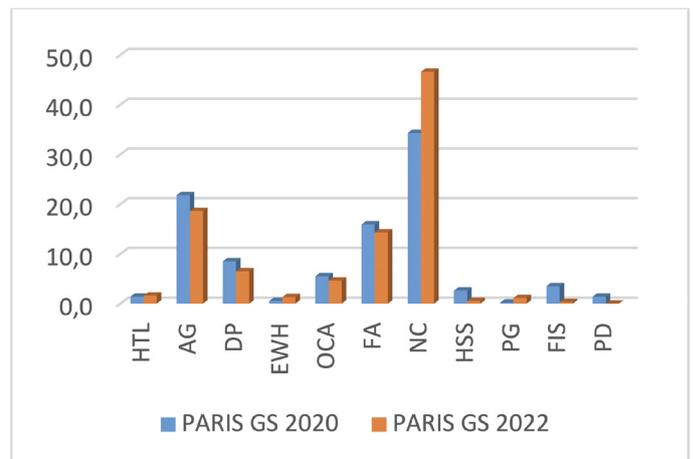


Figure 8. Individual penalties - male

Legend: HTL- Hold Trousers Leg, AG - Avoid Grip, DP - Defensive Posture, EWH - Escape With Head, OCA - Outside Contest Area, FA - False Attack, NS - Non Combativity, HSS - Hold Same Side, PG - Pistol Grip, FIS - Fingers In Sleeve, PD - Pull Down

T-test results for independent samples have indicated that there are no statistically significant differences in the AEI of female competitors (Figure 9) in *nage waza* ($t=-1.333$, $df=69$, $p=.187$) and *newaza* ($t= -1.333$, $df= 20$, $p=.970$) as well as in the *nage waza* of male competitors (Figure 10) ($t= -1.212$, $df= 74$, $p=.229$), while in *newaza* ($t= -2.073$, $df= 25$, $p=.049$) statistically significant differences were observed.

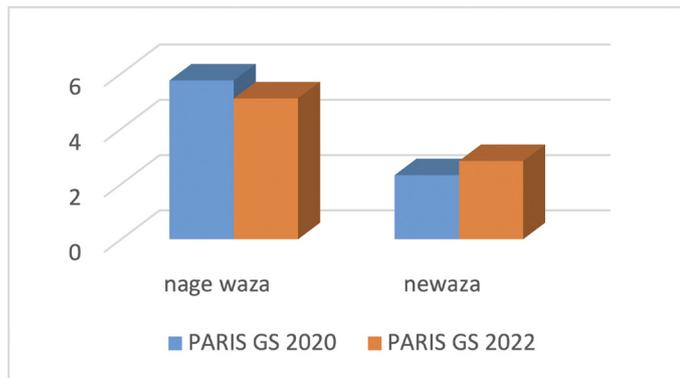


Figure 9. Attack efficiency index in *nage waza* and *newaza* (Sa) - Female

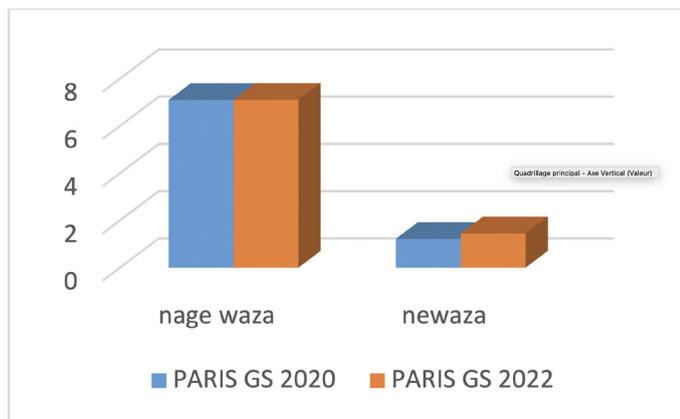


Figure 10. Attack efficiency index in *nage waza* and *newaza* (Sa) - Male

Pearson Chi-square test results did not show any significant differences (Figure 11) in variable subgroup of throwing techniques and groundwork techniques in female competitors ($\chi^2 = 12.680$; $df= 7$; $Sig.= .080$; Cramers $V= .169$; $Sig.= .080$), while in male competitors (Figure 12) there were statistically significant variables ($\chi^2 =15.137$; $df=7$; $Sig.=.034$; Cramers $V= .153$; $Sig.= .034$) in subgroups of throwing techniques and groundwork techniques.

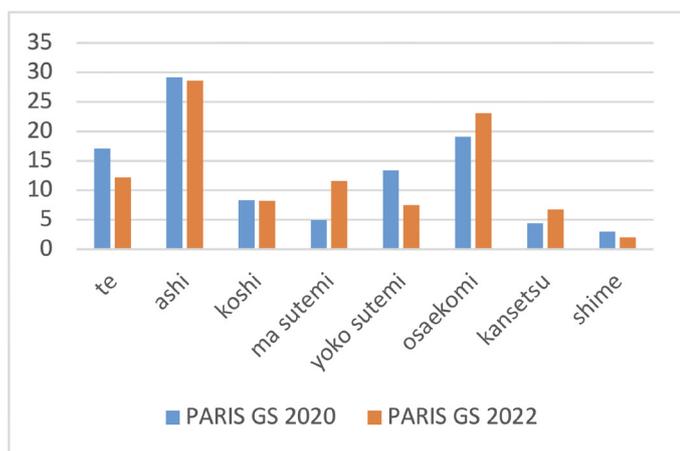


Figure 11. Subgroups of judo techniques - Female

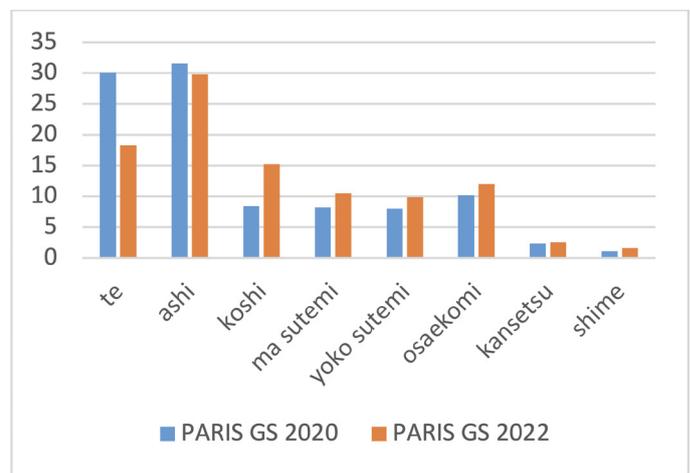


Figure 12. Subgroups of judo techniques - Male

Table 1 indicates the attack efficiency index (AEI) for individual throwing and grappling techniques performed by female and male competitors. For senior female competitors in Paris GS 2022, two techniques have proven to be most efficient: *yoko shihō gatame*, where AEI has risen in 2022, and *uchi mata*, where AEI has drastically risen in 2022. *Ōuchi-gari* has retained the same AEI level, however, in 2022 the groundwork technique *jūji gatame* has taken a high third place.

Table 1. Attack Efficiency Index (AEI) of individual throwing and grappling techniques

FEMALE				MALE			
Paris GS 2020	AEI	Paris GS 2022	AEI	Paris GS 2020	AEI	Paris GS 2022	AEI
YSG	0.75	YSG	0.88	SON	0.67	STO	0.69
UMA	0.49	UMA	0.87	SOT	0.62	OUG	0.56
OUG	0.46	JGT	0.52	UMA	0.60	UMA	0.54
SOT	0.41	SON	0.49	OUG	0.52	SUG	0.47
JGT	0.40	OUG	0.45	KSK	0.38	OGO	0.47
SMK	0.34	KKE	0.37	ISN	0.35	SOT	0.45
ISN	0.32	SUG	0.31	KUG	0.33	KSK	0.44
OSG	0.30	KSH	0.30	STO	0.32	KUG	0.37
KKE	0.27	TNG	0.29	UNA	0.28	ISN	0.35
KKS	0.27	TNO	0.22	SUG	0.26	KSH	0.29
SON	0.26	YOT	0.22	TOS	0.23	JGT	0.28
KSK	0.25	KKS	0.22	YSG	0.22	YSG	0.27
HRG	0.25	OGO	0.20	DAB	0.22	TNG	0.27
KUG	0.25	OSG	0.20	JGT	0.21	UMM	0.25
TNG	0.21	SOO	0.18	KGU	0.21	KKE	0.25
OSM	0.20	AGU	0.18	KKE	0.18	UMK	0.19
TNO	0.20	UMK	0.15	UMK	0.18	SON	0.17
OEJ	0.20	UGO	0.15	KKS	0.16	KGU	0.17
TSG	0.17	STO	0.15	SMK	0.15	SOO	0.17
STO	0.16	KEG	0.13	TGO	0.15	OSO	0.17

Legend: Legend: YSG *yoko shihō gatame*, UMA *uchi mata*, OUG *ōuchi gari*, SOT *sumi otoshi*, JGT *jūji gatame*, SMK *soto makikomi*, ISN *ippon seoi nage*, OSG *ōsoto gari*, KKE *kuzure kesa gatame*, KKS *kuzure kami shihō gatame*, SON *seoi nage*, KSK *kosoto gake*, HRG *harai goshi*, KUG *kouchi gari*, TNG *tomoe nage*, OSM *ōsoto makikomi*, TNO *tani otoshi*, OEJ *okuri eri jime*, TSG *tate shihō gatame*, STO *sode tsurikomi goshi*, SUG *sumi gaeshi*, KEG *kesa gatame*, TOS *tai otoshi*, KSH *kami shihō gatame*, YOT *yoko otoshi*, OGO *ōgoshi*, SOO *seoi otoshi*, AGU *ashi guruma*, UMK *kouchi makikomi*, UGO *uki goshi*, OSO *ōsoto otoshi*, UNA *ura nage*, DAB *deashi harai*, KGU *kata guruma*, TGO *tsuri goshi*, UMM *uchi mata makikomi*.



DISCUSSION

This research aimed to define the effects of changes in judo rules on competitors' performances between the Paris Grand Slam 2020 and that of 2022. The fight ratio percentage was the most impacted by, with female contestants 66% vs. 34% Paris GS 2020 vs. 2022, and male contestants at 70.9% at Paris GS 2020 vs 29.1%. The first reason is that 2020 was an Olympic year and the contestants were gathering points for the Olympic Games. The second reason was the COVID-19 pandemic. Due to these factors, a decreased number of fights and participants was noted in the 2022 event.

The average contest duration analysis showed no significant differences between female and male contestants. A detailed analysis of 12 decisions, which brought forth the changes in the rules, revealed that the time component was not impacted in any of them. Doppelhammer & Stöckl (2020) retrieved similar data on the effects of rule changes in 2017 and 2018 in regards to the duration of the fights and no differences were noticed between the 2015 Astana World Championships and the 2018 Baku World Championships. Gonçalves, Monteiro, Chambel, & Cardoso (2015) analysed the effects of rule changes in judo between the world championship of 2013 and 2014, where the duration of contests for women was reduced from 5 to 4 minutes and new penalties were introduced (*shidō*). The analysis suggested that the overall time (including breaks) of fights (in all weight categories) was reduced from 273 to 233 seconds. Likewise, the real-time (without a break) was reduced from 199 to 179 seconds.

Analysing the awarded points and penalties in senior female contests, one can state that there was an increase in *ippon* points awarded but a decrease in *waza ari* and *waza ari awasete ippon*. This could be interpreted as there being more direct attacks performed and scored by *judoka*. Regarding penalties, there was an increase in awarding *shidō* 1 and a slight decrease in awarding penalties *shidō* 2 and *shidō* 3 at Paris GS 2022. In male seniors, there was a noticeable decrease in *ippon* points awarded and an increase in *waza ari* and *waza ari awasete ippon*. A slight decrease was noted in the awarding of *shidō* 1, *shidō* 2 and *shidō* 3. In general, the rule changes in judo in 2020 had some, but not statistically significant, effects.

It was noticed, following an individual penalties analysis for female seniors, that in 2022 there was an increase in penalties for pinning sleeves, avoidance, grips and pistol grip, but a decrease for penalties given for holding the same side and fingers in sleeve. On the other hand, in male seniors at the Paris GS 2022, an increase in penalties for pinning sleeves and non-combativeness was noticed, while penalties for holding the belt, holding same side, fingers in sleeve, pulling down, and bending the opponent's fingers have decreased noticeably. In the context of Decision 4, regarding landing simultaneously on 2 elbows, for female

competitors at Paris GS 2022, out of the overall number of penalties, *shidō* was awarded 0.34%, while for male competitors at Paris GS 2022, it was reported at 1.1%. Data showed that the particular method of falling, targeted by the rule change, was not frequent. However, it is still useful in preventing arm and/or elbow and/or shoulder and/or neck injuries. One can state that the competitors and coaches have adapted to this new situation because they are aware that they will be awarded a penalty and the opponent a *waza-ari* and in such circumstances, they can lose the contest. Decision 12 stated that techniques with head diving are dangerous and will be penalised with *hansoku make*. In female competitors there were none but in male competitors there were 0.53% (2) at Paris GS 2022. Considering that these techniques present dangerous situations for the spine, disqualification is justified, to prevent the application of these techniques. Based on individual penalty indicators, one can state that changes in the rules in 2022 have had specific effects on the individual penalties of both female and male competitors. Ceylan and Balci (2017) researched the effects of new rule applications in judo by comparing points and penalties at the Paris GS between 2016 and 2017. The results indicated that the frequency of *ippon* and *hansoku make* being awarded did not significantly change after the new rule applications, with both men and women. The previous rule change brought forth the rise of *waza ari* points for both groups, while the total number of *shidō* was reduced in men's fights.

With analysis of subgroups of judo techniques in female seniors at Paris GS 2022, a decrease in the efficiency of hand, side sacrifice techniques and choking techniques was noticed, while rear sacrifice, grappling and joint lock techniques rose. However, the application of foot and rear techniques remained at the same level as in 2020. In senior male contestants in 2022, a decrease in the efficiency of hand techniques was also noticed and a slight decrease in foot throwing techniques, while an increase was noticeable for side, sacrifice throws to the side and rear, gripping, joint lock, and choking techniques. The most probable reason for these observations is the banning of reverse *seoi nage* and *sumi otoshi* (Decision 5). We can assume that this forced competitors to compensate for the forbidden techniques with the application of other judo techniques. Data indicates that in the 2020 Paris GS, these forbidden techniques were used by women, for *sumi otoshi* 4.7% (14) and by men in 5.23% (26) of the total points awarded for throwing techniques. It is also related to Decision 6, which does not award points or penalties for reverse *seoi nage*. The female competitors at Paris GS 2020 applied reverse *seoi nage* up to 1.01% (3) and male competitors up to 1.1% (5) out of the total number of points for throwing techniques. However, these numbers do not present a significant effect. Nevertheless, the foundation for this decision was that, as uke, during the fall, does not have the possibility to escape, this situation often leads to falling on the head, which increases the occurrence of injuries.

Usage of *seoi nage* throwing techniques, when eliminating reverse *seoi nage*, rose at Paris GS 2022, while the efficiency of *seoi otoshi* as a counter technique to tori's attack decreased in 2022. The only constant regarding the attack efficiency index (AEI) was the leg throwing technique *uchi mata* which was in third place in both competitions. *Seoi nage* throws at Paris GS 2022 fell to seventeenth place. *Seoi otoshi*, the technique which came second in 2020, at the Paris GS 2022 was in sixth place. *Ōuchi-gari* rose to second place and *sumi gaeshi*, the sacrifice technique, moved to a higher place in 2022. Martins et al. (2019) analysed the 2017 senior world championships and the techniques used most often were: *seoi nage*, *ōuchi-gari*, *uchi mata*, *kōuchi-gari*, *ippon seoi nage*, *kōsoto gake*, *sode tsurikomi goshi*, *sumi otoshi*, *ōsoto gari*, *sumi gaeshi* and *tai otoshi*, while the throwing techniques performed by gripping below the belt were no longer attractive, all because of the change of judo rules.

Doppelhammer & Stöckl (2020) researched the effects of rule changes between world championships in 2015 and 2018. Men increased the number of *ippon* scores from 0.17 in Astana in 2015 to 0.23 in Baku in 2018, but this was not the case for women. There were no statistically significant differences between the two tournaments in the number of *waza ari* (+ *yūkō*) points, for men or women. There were no differences between the number of *shidō* for the entire female sample as well. However, male competitors significantly lowered the number of *shidō* actions in 2018. In 2015, out of the entire number of analysed fights, 31.2% were decided by *ippon*. In 2018 the percentage was 43.5%. Likewise, *ippon* fight decisions in male fights rose from 19.5% in Astana in 2015 to 26.3% in Baku in 2018, but this was not the case for women's fights. The number of *shidō* actions in a fight indicated a significant decrease in Astana in 2015, where 21.4% of fights were decided in that way, while in Baku in 2018 only 7.1% of all fights were decided by *shidō*.

Pan et al. (2021) analysed rule changes between judo world championships in 2017 and 2019. In male competitors, the use of *koshi waza* and *yoko sutemi waza* was significantly increased and the use of *ma sutemi waza* significantly decreased. *Koshi waza* and *yoko sutemi waza* in male competitors was significantly higher than before the change of rules and the rate of use of *ma sutemi waza* was significantly lower than before the rule changes. In senior female competitors, the use of *koshi waza* was significantly increased, while the use of *ashi waza* and *ma sutemi waza* was significantly reduced. The rate of using *koshi waza* in female competitors' fights after the change of rules was significantly higher than before the change of rules and the rate of using *ashi waza* and *ma sutemi waza* was significantly lower than those before the rule changes. The greatest rate of throwing techniques was for *koshi waza*, followed by *te waza* and *ashi waza*.

It should be noted that this analysis was done during the so-called 'transition period,' with competitors adapting to the new rules. Therefore, full results of the effects of rule

changes in judo will be gained by analysing the qualification cycle for the next Olympic Games. Furthermore, further research should also examine the analysis of the rule changes on different age groups for both genders.

CONCLUSION

Based on the results gained, effects on certain performances in female and male competitors at the Paris GS tournament in 2022 were noticed. Technique-wise, for senior female competitors, *yoko shihō gatame*, *uchi mata* and *ōuchi-gari* have remained the first three most efficient techniques but exhibited different efficiency indexes in the competitions. In senior male competitors, the most successful techniques in Paris GS 2020 were *seoi nage*, *sumi otoshi* and *uchi mata*, while in Paris GS 2022 those changed to *sode tsurikomi goshi*, *ōuchi-gari* and *uchi mata*. These changes have forced coaches and athletes to adapt fast, through the training process and in competitions and they tried to make their fights more innovative by applying judo techniques and new technical and tactical fighting methods. In this way, looking for new 'do' roads in judo is a constant process, of which Jigoro Kano Shihan would be very proud.

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