CONCENTRATION TIME VALUES IN TWO-ARM SNATCH WEIGHTLIFTING, 109-KG JUNIOR CLASS (UNDER 20)

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Abstract. *Elite sport is a social phenomenon strongly anchored in the reality of today's world. In an increasingly advanced technological society, no one is surprised by the use of the fastest means of multimedia communication. Implementing this technology in the field of top-level sport offers multiple possibilities for an objective behavioural analysis of athletes during competition. This study, the first to address juniors aged 17-20 years, is part of a broader research aimed at investigating athletes (of both genders and different classes) with regard to certain moments that involve the analysis of concentration times characterising weightlifting styles. The current study focuses on the recording and analysis of concentration times from the moment the feet are just under the bar until the bar is lifted off. Objectives: 1. To examine the possibilities of using the computerised imaging technique in snatch weightlifting; 2. To identify concentration times in snatch weightlifting by recordings and measurements performed with AviSynth equipment. The main research method used is computerised technology connected to video technology. The research presents the recording and analysis of concentration times for snatch weightlifters in value group A, 109-kg Junior Class. It includes 11 male athletes aged 17-20 from various countries. Thus, Bulgaria participated with two athletes, and Albania, Armenia, Azerbaijan, Belarus, Georgia, Poland, Russia, Spain and Turkey, with one athlete each. The result analysis highlights aspects regarding concentration times in the snatch event: average concentration times for the three attempts and for each attempt, the relationship between lifted weight and concentration time.*

Keywords: *weightlifting, two-hand snatch, concentration time, imaging technique, elite sport.*

Introduction

In 2019, Romania was granted the right to organise the European Championships for Youth (Under 23) and Juniors (Under 20), a qualifying stage for the Tokyo Olympic Games. The competition took place from 18 to 27 October 2019 at the RIN Grand Hotel (Bucharest Hall), in the capital city of Romania, and lined up at the start 328 athletes from 38 countries. The Romanian delegation was made up of 31 competitors. For Juniors (Under 20), our country was represented by 23 athletes, 12 in women's competition and 11 in men's competition, while for Youth (Under 23), it was represented by 8 athletes, 4 females and 4 males. It was a highly valuable competition where 93 European records and one World record were broken, the Romanian weightlifting school managing to confirm once again its value through the 25 medals won: for Juniors (Under 20), 18 medals (3 gold, 9 silver and 6 bronze medals); for Youth (Under 23), 7 medals (1 gold, 2 silver and 4 bronze medals). These remarkable results obtained by our athletes depended on how they managed to focus their attention so that they could use their full physical and mental potential at the optimum time.

One of the most important aspects in weightlifting training is attention, or, more specifically, concentration time, which has a decisive impact on the achievement of sport performance. A major factor in obtaining such exceptional results is psychological training for competition, along with physical and technical training. The short duration of some exercises and the need to perform them with maximal effort require a particular focus of attention (also called attentional focus), which refers to the possibility of both inducing a high level of arousal and mobilising all physical and mental capabilities at a certain moment. Concentration and mobility of attention are known to play an important role in producing adaptive behaviours, thoughts and decisions (Predoiu et al., 2017).

Several studies mention a significant connection between attentional focus and sport performance (provided that the tasks are done at a fast pace), which is reflected in the official ranking (Tüdös et al., 2015).

In the context of sport and exercise performance, attentional focus refers to the process in which the athlete allocates mental resources to cues, stimuli or states and is commonly classified into one or more dimensions (Neumann, 2019). Thus, Nideffer (1976) talks about two dimensions of attentional focus: direction (which can be internal or external) and width (which can be broad or narrow).

Major international competitions bring together athletes who have approximately the same level of physical, technical and tactical preparedness. Outstanding athletes are generally characterised by the ability to actively fight against the most valuable competitors in the most important competitions.

Under complex combat conditions, the sport results are determined by the level of athletes' psychomotor skills and ability to maximise their potential and assess their strength curve with the help of coaches, which will allow them to make best use of their own capabilities in the competitive activity (Bocioacă, 2013).

Modern technology supports sport science by offering it the opportunity to use computerised assistance connected to video equipment, which allows the recording and processing of the actions performed by athletes (Potop et al., 2015).

The level of emotional arousal before competitions can increase but can also remain unchanged. In the most favourable cases, the optimum level of volitional emotional tension coincides with the start time, when athletes usually exploit their level of preparedness and, at a higher level, their reserve potential, too (Platonov, 2015). Making effective use of modern teaching programmes can improve the possibilities of objective behavioural analysis of junior athletes in competition (Ulăreanu et al., 2018).

Attention involves the existence of a certain degree of focus on an area that becomes central in relation to the rest of the whole, which will end up with occupying a marginal position. Attention is the mental phenomenon (function) that designates the selective orientation of activity and the focus of mental energy on an object in order to know it better and thus act more efficiently. (Păunescu et al., 2015)

Elite sport, under its multiple aspects, is a social phenomenon strongly anchored in the reality of today's world. In an increasingly advanced technological society, no one is surprised by the use of the fastest means of multimedia communication. Implementing this technology in the field of top-level sport offers multiple possibilities for an objective behavioural analysis of athletes during competition (Potop et al., 2015). In the theory and practice of top-level sport,

a rich experience has already been gained in the use of multimedia technology, the analysis and processing of competition data, the analysis of technical elements and procedures, as well as the establishment of biomechanical parameters (Ulăreanu et al., 2014). The need to increase performance by using more effective means for information accuracy, reduced training time and improved control of variables has led to the instrumentalization of training (Epuran & Stănescu, 2010).

Regular changes in competition regulations and the increased level of training have induced major changes in addressing it, namely reassessing the means of specific training. Connecting training to the new changes in competition regulations requires using modern methods of investigation and improvement of specific training by increasing the intensity of means specific to the weightlifting technique (Potop & Ulăreanu, 2011).

In order to reach increased effectiveness in weightlifting, all factors that contribute to sport performance should be taken into account; thus, the activities will be performed in correlation with individual characteristics so that the final results correspond to each athlete's expectations.

A sport technique is a sequence of efficient movements that serve as a solution to a problem specific to sport situations (Martin et al., 1991, cited by Urso, 2011). Performance is conditioned by many factors that obviously have different weight depending, for instance, on the characteristics of various sports. In addition to the weight of these factors, we also mention that certain factors are present in all sports, for example, concentration. Achieving exceptional performance is strictly conditioned by this factor for which the literature uses two terms: attention and concentration. Psychologists make a distinction between attention, which is most generally seen as selective orientation, and concentration, which is described as a characteristic of attention. Compared to all other factors, the researchers' interest in this factor is constant, starting from the assumption that one cannot lift a weight by simply relying on physical abilities and without being highly mentally involved in terms of concentration. Addressing this factor during specific training sessions should be done in a strictly differentiated way, namely by using methods aimed to develop the ability of staying focused combined with technical and tactical aspects.

In weightlifting, all moments of the competition must be exploited. To highlight the importance of concentration in weightlifting, we will express our view of the types of concentration and the moments when these types of concentration are present. Our research on how to focus when lifting the barbell has led to structuring concentration as follows: a) low-intensity concentration (ideomotor representations) – when a specific competition is announced (a few days before the competition, on the day of the competition, before the start of the competition); b) medium-intensity concentration – before the start of the competition and the warm-up, before stepping on the competition platform; c) maximum concentration – when lifting the barbell (in both styles), fixing the soles, bending the torso, fixing the hands on the bar, lifting the barbell off the ground, jerking, lunging, fixing the barbell, raising to stand from lunging, stabilising the barbell overhead (for the snatch style), starting the position for chest pushing, as well as at the concentration moment (Ulăreanu & Potop, 2017), when performing the half-squat and cleaning (for the clean-and-jerk style).

In these phases, the athlete has narrow-external attention (perceived grip of the barbell) and narrow-internal attention (focused on the maximum effort required by the task). According to Neumann (2019), an external focus of attention can be promoted by directing athletes to focus

on visual cues like barbell movement, pushing against the barbell, or the final result of the lift, while an internal focus can be promoted by instructions that direct athletes to focus on muscle tension, body movements, technique and form.

As a condition of objectivity, we chose a multimedia technique for the recording and quantitative analysis of both the total duration and the separate durations of the different phases of barbell lifting.

Research purpose

This study, the first to address juniors aged 17-20 years, is part of a broader research aimed at investigating athletes (of both genders and different classes) with regard to certain moments that involve the analysis of concentration times characterising weightlifting styles.

The current study focuses on the recording and analysis of concentration times from the moment the feet are just under the bar (T2) until the bar is lifted off (T4) for snatch weightlifters in value group A, 109-kg Junior Class (Under 20).

Objectives

1. To examine the possibilities of using the computerised imaging technique in snatch weightlifting.
2. To identify concentration times in snatch weightlifting by recordings and measurements performed with the AviSynth program.

Research question

The identification of concentration times in snatch weightlifting allows comparing weightlifters and then making correlations and observations regarding their performance?

Methodology

Participants

This study includes 11 male athletes aged 17-20 from various countries. Thus, Bulgaria participated with two athletes, and Albania, Armenia, Azerbaijan, Belarus, Georgia, Poland, Russia, Spain and Turkey, with one athlete each.

Methods

The main research method used is computerised technology connected to video technology. The study consists in using the imaging technique and presents the recording and analysis of concentration times for snatch weightlifters in value group A, 109-kg Junior Class. All recordings and measurements were performed with AviSynth equipment consisting of: electronic computer, camcorder, tripod, laptop, video monitor (“AviSynth”, 2018).

Procedure

The first stage of the research was conducted between 18 and 27 October 2019 at the RIN Grand Hotel (Bucharest Hall), in the capital city of Romania, where we performed the selection and video recording of participating athletes.

In the second stage, the AviSynth program was used to process and analyse the results (data ordering: number of frames per execution, conversion of frames into seconds, etc.). Then, we draw conclusions and made observations (based on the results obtained by athletes).

Results

After analysing the results obtained by the 11 finalists in the 109-kg Junior Class (Under 20) for the two-arm snatch style, we can state that:

The good performance of junior weightlifters in competition is given by the mobilisation of all their physical and mental abilities within a given time. Obviously, compliance with the provisions of the regulation is required in terms of duration, namely the maximum time for an attempt, which decreased from 120 seconds to 60 seconds. Coaches, athletes and specialists in the field were much more receptive to the major regulation changes related to the modification of weight classes imposed by the “clean sport” phrase, which led to the reconsideration of all training and competition factors. An analysis of the results shows very high variability in individual concentration times for all the 11 finalists investigated in this study. At a closer look, it can be seen that the concentration time is specific to each athlete. For example, in the 109-kg Junior Class (Under 20), there are athletes who obviously need a longer concentration time, as shown in Tables 14 and 15. Thus, Table 15 highlights that the average concentration time in the two-arm snatch style for the Polish athlete is 18.89 seconds. The athlete from Turkey also needs a longer concentration time, 18.17 seconds (Table 14). The concentration time value increases with the weight of the barbell, as revealed in Tables 8, 9 and 11. Concentration time values for the 3 top-ranked athletes in this weight class are as follows: the gold medallist (BUL1) - in the first attempt, 8.23 seconds (170 kg), in the second attempt, 7.93 seconds (175 kg), and in the third attempt, 10.96 seconds (180 kg) (Table 18); the silver medallist (BLR) - in the first attempt, 6.23 seconds (164 kg), in the second attempt, 7 seconds (171 kg), and in the third attempt, 5.53 seconds (176 kg) (Table 16); the bronze medallist (RUS) - in the first attempt, 11.73 seconds (165 kg), in the second attempt, 17.26 seconds (170 kg), and in the third attempt, 21 seconds (170 kg) (Table 17).

The performance achieved by weightlifters in the two-arm snatch style, 109-kg Junior Class (Under 20), is presented in Tables 2 to 7 and reveals the following aspects: the concentration time from the moment the feet are just under the bar (T2) until the bar is lifted off (T4) for the first attempt ranges between 3.4 and 20.73 seconds (Table 5); the average concentration time between the two moments for the first attempt is 10.05 seconds; the difference between the highest concentration time and the lowest concentration time for the first attempt is 17.33 seconds; the concentration time from the moment the feet are just under the bar (T2) until the bar is lifted off (T4) for the second attempt is between 4.3 and 17.26 seconds; the difference between the highest concentration time and the lowest concentration time for the second attempt is 12.96 seconds (Table 3); the average concentration time between the two moments

for the second attempt is 11.75 seconds (Table 6); the concentration time from the moment the feet are just under the bar (T2) until the bar is lifted off (T4) for the third attempt is between 5.06 and 21.03 seconds (Table 4); the difference between the highest concentration time and the lowest concentration time for the third attempt is 15.97 seconds; the average concentration time between the two moments for the third is 13.68 seconds (Table 7).

Table 1. *Research participants*

No.	Competition no.	Initials	Country	Date of birth	Class
1	32	H.H.	BUL	27.04.2001	109
2	52	N.A.	AZE	26.11.1999	109
3	236	M.Y.	ARM	17.09.2001	109
4	238	V.D.	RUS	13.11.2001	109
5	262	H.S.	BUL	02.09.2002	109
6	290	A.C.	TUR	15.08.2001	109
7	620	H.R.	ALB	15.06.2000	109
8	702	K.K.	BLR	04.08.2000	109
9	882	T.A.	GEO	29.07.2001	109
10	901	T.M.	ESP	19.03.2000	109
11	977	I.M.	POL	06.03.1999	109

Table 2. *Structure of two-hand snatch and duration of times – first attempt*

No.	Initials	Country	Time 1	Time 2	Time 3	Time 4	Time 5	Lifted weight	Successful/ Failed attempt
1	T.M.	ESP	2151	2286	2451	2646	2766	135	Successful
2	N.A.	AZE	8917	9044	9246	9441	9553	142	Successful
3	H.S.	BUL	11301	11443	11564	11639	11758	145	Successful
4	H.R.	ALB	13131	13236	13311	13338	13438	145	Successful
5	T.A.	GEO	20706	20848	20901	21061	21148	147	Successful
6	M.Y.	ARM	24418	24561	24598	24674	24764	150	Successful
7	A.C.	TUR	33809	33907	34063	34438	F	154	Failed
8	I.M.	POL	46603	46791	46942	47413	47544	157	Successful
9	V.D.	BLR	59440	59623	59728	59810	59893	164	Successful
10	K.K.	RUS	61169	61311	61573	61663	61753	165	Successful
11	H.H.	BUL	63734	63974	64078	64221	64318	170	Successful

Table 3. *Structure of two-hand snatch and duration of times – second attempt*

No.	Initials	Country	Time 1	Time 2	Time 3	Time 4	Time 5	Lifted weight	Successful/ Failed attempt
1	T.M.	ESP	6344	6486	6668	6898	6996	140	Successful
2	N.A.	AZE	16993	17101	17268	17571	F	145	Failed
3	H.S.	BUL	26053	26166	26301	26368	26496	150	Successful
4	H.R.	ALB	28499	28559	28578	28688	28701	151	Successful
5	T.A.	GEO	30868	31018	31117	31230	31326	152	Successful
6	M.Y.	ARM	38418	38572	38863	39078	39178	155	Successful
7	A.C.	TUR	40168	40236	40318	40710	40815	155	Successful
8	I.M.	POL	53474	53872	54006	54381	F	161	Failed
9	V.D.	RUS	65534	65676	65871	66194	66284	170	Successful
10	K.K.	BLR	67183	67281	67371	67491	67566	171	Successful
11	H.H.	BUL	69883	70028	70153	70266	70363	175	Successful

Table 4. *Structure of two-hand snatch and duration of times – third attempt*

No.	Initials	Country	Time 1	Time 2	Time 3	Time 4	Time 5	Lifted weight	Successful/ Failed attempt
1	T.M.	ESP	15248	15328	15486	15803	F	145	Failed
2	N.A.	AZE	22229	22393	22589	22911	23001	147	Successful
3	H.Ş.	BUL	36831	36936	37072	37131	F	154	Failed
4	H.R.	ALB	43078	43176	43297	43328	F	156	Failed
5	T.A.	GEO	44563	44684	44738	44893	44991	156	Successful
6	M.Y.	ARM	48726	48868	49161	49511	49611	158	Successful
7	A.C.	TUR	51028	51133	51198	51764	51838	159	Successful
8	I.M.	POL	57441	57734	57823	58304	F	161	Failed
9	V.D.	RUS	71316	71473	71788	72103	72201	175	Successful
10	K.K.	BLR	73558	73670	73746	73836	73970	176	Successful
11	H.H.	BUL1	75628	75756	75959	76085	76206	180	Successful

Table 5. *Results for concentration time – Conversion of frames into seconds for the first attempt, two-hand snatch*

No.	Country	Class	Lifted weight	Attempt	Frames	Concentration time
1	ESP	109	135	I	360	12
2	AZE	109	142	I	397	13.23
3	BUL	109	145	I	196	6.53
4	ALB	109	145	I	102	3.4
5	GEO	109	147	I	213	7.1
6	ARM	109	150	I	113	3.76
7	TUR	109	154	I	531	17.7
8	POL	109	157	I	622	20.73
9	BLR	109	164	I	187	6.23
10	RUS	109	165	I	352	11.73
11	BUL1	109	170	I	247	8.23

Table 6. *Results for concentration time – Conversion of frames into seconds for the second attempt, two-hand snatch*

No.	Country	Class	Lifted weight	Attempt	Frames	Concentration time
1	ESP	109	140	II	412	13.73
2	AZE	109	145	II	470	15.66
3	BUL	109	150	II	202	6.73
4	ALB	109	151	II	129	4.3
5	GEO	109	152	II	212	7.06
6	ARM	109	155	II	506	16.86
7	TUR	109	155	II	474	15.8
8	POL	109	161	II	509	16.96
9	RUS	109	170	II	518	17.26
10	BLR	109	171	II	210	7
11	BUL1	109	175	II	238	7.93

Table 7. *Results for concentration time – Conversion of frames into seconds for the third attempt, two-hand snatch*

No.	Country	Class	Lifted weight	Attempt	Frames	Concentration time
1	ESP	109	145	III	475	15.83
2	AZE	109	147	III	518	17.26
3	BUL	109	154	III	195	6.5
4	ALB	109	156	III	152	5.06
5	GEO	109	156	III	209	6.96
6	ARM	109	158	III	643	21.43
7	TUR	109	159	III	631	21.03
8	POL	109	161	III	570	19
9	RUS	109	175	III	630	21
10	BLR	109	176	III	166	5.53
11	BUL1	109	180	III	329	10.96

Table 8. *Technical performance behaviour of athlete T.M. – ESP*

Lifted weight	Attempt	Successful/Failed	Concentration time
135	I	Successful	12
140	II	Successful	13.73
145	III	Failed	15.83

Table 9. *Technical performance behaviour of athlete N.A. – AZE*

Lifted weight	Attempt	Successful/Failed	Concentration time
142	I	Successful	13.23
145	II	Failed	15.66
147	III	Successful	17.26

Table 10. *Technical performance behaviour of athlete H.Ş. – BUL*

Lifted weight	Attempt	Successful/Failed	Concentration time
145	I	Successful	6.53
150	II	Successful	6.73
154	III	Failed	6.5

Table 11. *Technical performance behaviour of athlete H.R. – ALB*

Lifted weight	Attempt	Successful/Failed	Concentration time
145	I	Successful	3.4
151	II	Successful	4.3
156	III	Failed	5.06

Table 12. *Technical performance behaviour of athlete T.A. – GEO*

Lifted weight	Attempt	Successful/Failed	Concentration time
147	I	Successful	7.1
152	II	Successful	7.06
156	III	Successful	6.96

Table 13. *Technical performance behaviour of athlete M.Y. – ARM*

Lifted weight	Attempt	Successful/Failed	Concentration time
150	I	Successful	3.76
155	II	Successful	16.86
158	III	Failed	21.43

Table 14. *Technical performance behaviour of athlete A.C. – TUR*

Lifted weight	Attempt	Successful/Failed	Concentration time
154	I	Successful	17.7
155	II	Successful	15.8
159	III	Successful	21.03

Table 15. *Technical performance behaviour of athlete I.M. – POL*

Lifted weight	Attempt	Successful/Failed	Concentration time
157	I	Successful	20.73
161	II	Failed	16.96
161	III	Successful	19

Table 16. *Technical performance behaviour of athlete V.D. – BLR*

Lifted weight	Attempt	Successful/Failed	Concentration time
164	I	Successful	6.23
171	II	Successful	7
176	III	Successful	5.53

Table 17. *Technical performance behaviour of athlete K.K. – RUS*

Lifted weight	Attempt	Successful/Failed	Concentration time
165	I	Successful	11.73
170	II	Successful	17.26
175	III	Successful	21

Table 18. *Technical performance behaviour of athlete H.H. – BUL*

Lifted weight	Attempt	Successful/Failed	Concentration time
170	I	Successful	8.23
175	II	Successful	7.93
180	III	Successful	10.96

Conclusion

This research on concentration time for snatch weightlifters in value group A, 109-kg Junior Class (Under 20), has led to the following conclusions:

- there is very high variability in individual concentration times for all the 11 finalists. This variability entitles us to consider that the training of concentration skills within the limits of an optimal interval also determines good athletic performance;
- for most athletes, the concentration time in each attempt is shorter than in the next ones;

- the concentration time value increases with the weight of the barbell;
- the concentration time value has a different effect on athletes' results.

After analysing the research results, some aspects were revealed regarding the concentration time in snatch weightlifting, and among them we mention: the average concentration times for the three regulatory attempts; the average concentration time for each attempt; the ratio between the weight of the barbell and the concentration time.

Concerning the concrete results obtained in the research, we note the following: the average concentration time for the first attempt is 10.05 seconds; the average concentration time for the second attempt is 11.75 seconds; the average concentration time for the third attempt is 13.68 seconds. Increasing the weight of the barbell also increases the concentration time. The average concentration time for the three attempts is 11.82 seconds.

Authors' Contributions

All authors have equally contributed to this article and should be considered as main authors.

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